FINAL REPORT: PHASE 1 EVALUATION OF THE EFFICIENCY VERMONT EFFICIENT PRODUCTS PROGRAM

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June 10, 2002

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EPP EXECUTIVE SUMMARY

This is the Final Report of the Phase 1 Evaluation of Efficiency Vermont's (EVT's) Efficient Products Program (EPP). The overall goal of the EPP is to increase the market share of efficient residential lighting equipment and appliances through a combination of customer incentives, retailer support, and broad-based marketing. This evaluation assesses the accomplishments of the program from its inception in March 2000 through December 2002.

E.1 INTRODUCTION

E.1.1 Program Description and Operations through May 2002

Program Objectives. The objectives of the EPP, as stated in the original program plan, are to :

- Increase market recognition of ENERGY STAR® labeled products;
- Increase the level of awareness and knowledge of consumer benefits of compact fluorescent lighting and energy-efficient appliances;
- Increase the level of customer adoption of efficient residential lighting and appliances;
- Increase retailer and dealer stocking and promotion of efficient residential lighting and appliances;
- Increase use of efficient lighting and appliances in multifamily and institutional residential markets.

Program Development. Both the lighting and appliance components built on predecessor utility programs that served most of Vermont's residential electric customers. Vermont electric utilities had offered programs to promote the purchase and use of compact fluorescent (CFL)[1] bulbs and, later, fixtures[2] more or less continuously since 1994. In late 1998, all of the Vermont utilities joined in a statewide rebate program based on the regional "StarLights" approach facilitated by the Northeast Energy Efficiency Partnerships (NEEP).

All of the major Vermont utilities except Washington Electric Coop had offered incentives for the purchase of resource efficient clothes washers beginning in late 1997. Most joined in the NEEP coordinated ENERGY STAR appliance program in 1999. The lighting component went into

[1] In this report, we use the term Compact Fluorescent Lamps (CFLs) to refer to light bulbs that use compact fluorescent technology and to permanent and portable light fixtures that are designed to accept compact fluorescent replacement bulbs only.

[2] Fixtures include permanent wall, ceiling, and exterior fixtures, as well as movable table lamps and floor lamps (torchieres).

operation in March 2000. EVT took over administration of the clothes washer rebate operations in March 2000.

Program Design and Operations. The following paragraphs describe the key features of the lighting and appliance components of the EPP.

- ***Customer Services and Incentives: Lighting.*** The lighting component offers instant coupons for the purchase of ENERGY STAR-qualified compact fluorescent bulbs and fixtures. Coupon values for compact fluorescent bulbs were initially set at $8; they were lowered to $7 by June 2000, then to $4 by end of 2001 in response to evidence of increased availability, broader product selection, and lower prices for qualifying products. In June 2000, the program was opened to commercial as well as residential customers. Customers were permitted to purchase 6 bulbs and 4 fixtures at one time. Non-torchiere light fixture coupon values were initially set at $20 and reduced to $15 during 2001. In addition to instant coupons, the program has sponsored many special events to promote and sell efficient lighting products, including a number of torchiere turn-ins. Customers could also purchase compact fluorescent bulbs and fixtures at discounted prices through a catalog mailed to some residential customers. Catalog sales represented roughly 3 percent of units sold or rebated through the program.
- ***Customer Services and Incentives: Clothes Washers.*** All electric customers are eligible to receive incentives for the purchase of ENERGY Star-qualified clothes washers. Rebates were set at $75 during the first EVT program year. They were reduced in June 2001 to $50. Predecessor utility programs offered rebates as high as $200 and were set at $100 during 1999.
- ***Retailer Services.*** The program offers a number of services to retailers participating in the program, including installation of point of purchase displays, assistance in ordering and stocking qualifying products, and sales staff training. These services were provided by the firm Advanced Proactive Technologies (APT) under contract to EVT. In addition to clothes washers, the program provided marketing support (but no customer incentives) for ENERGY STAR-qualified dishwashers, refrigerators, and room air conditioners. In order to receive support services and issue rebate coupons, retailers must sign a Memorandum of Understanding with APT, undertaking to maintain point of purchase displays, receive training, and permit APT to conduct inventories of qualifying products.
- ***Marketing.*** EVT participates in the national ENERGY STAR brand recognition effort, undertakes local advertising, and stages special promotion events to support the program.

Program Operations through 2002. Table E-1 summarizes key indicators of program activity for the first two years of program operation. Participation in the appliance component has held fairly steady over the life of the program. The number of ENERGY STAR clothes washers rebated each year has ranged from 2000 to 2,680, or 16 to 22 percent of the total annual sales of clothes washers. Participation in the lighting component increased rapidly after EVT assumed management of the program statewide. Total participation for predecessor programs averaged 9,000 to 10,000 customers, with the volume of CFLs and fixtures rebated hovering around

20,000. In 2000[3], participation reached 13,608 customers, who purchased over 56,000 CFL bulbs and nearly 23,000 fixtures through the program. The number of customers participating increased by 79 percent from 2000 to 2001; the number of bulbs and fixtures rebated increased by 37 percent. In 2002, the number of customers purchasing efficient lighting through the program decreased by 19 percent, although the volume of bulbs and fixtures decreased by only 9 percent. Over the first three years of program operation, analysis of coupon redemption records found that 49,453 unique customers -- or 20 percent of all households -- purchased efficient lighting equipment through the program.

Table E-1
Summary of EPP Program Activities

Component/ Year	# of Stores Enrolled	# of Participants (Rebate Recipients)	# of Rebates Issued	Other Program Activities
APPLIANCES				
2000	60	2,476	2,476	Participation in national and regional ENERGY STAR promotion activities.
2001	91	2,563	2,563	Participation in national and regional ENERGY STAR promotion activities.
2002	91	2,370	2,370	Participation in national and regional ENERGY STAR promotion activities.
Total	**91**	**7,409**	**7,409**	
LIGHTING				
2000	105	13,608	Bulbs: 56,511 Fixtures: 22,887	Torchiere Turn-in: 3,000 halogen torchieres exchanged; 5,300 bulbs and 400 fixtures sold.
2001	108	24,342	Bulbs: 86,353 Fixtures: 22,294	36 Special Events: Torchiere turn-ins, home show booths, in-store promotions.
2002	125	19,802	Bulbs: 95,517 Fixtures: 15,522	31 Special Events through October.
Total	**125**	**49,453**	**Bulbs: 237,722** **Fixtures: 60,649**	

E.1.2 Overview of the Phase 1 Evaluation

The key objectives of the Phase 1 EPP Evaluation were as follows.

Characterization of Baseline Conditions. The primary research questions addressed by the baseline characterization are:

- How large are the residential markets for compact fluorescent bulbs, lighting fixtures, and the four appliances covered by the program?

[3] The program was launched in March 2000.

- What are the principal segments of the customer market and supply chains for those products?
- What were the conditions of the residential lighting and appliance markets around the time the EVT programs began in regard to supply-side actor promotion and customer acceptance of efficient products?

Assessment of Program Market Effects. Most of the research and analytical effort for this evaluation was expended to assess the effect of the EPP on sales of efficient lighting products and appliances and, where possible, to distinguish the effect of the program from other potential influences on customer and retailer behavior. Specific research questions in regard to market effects included the following.

- To what extent did participating and nonparticipating customers adopt efficient lighting equipment and appliances? How does their level of adoption compare to customers in similar situations who were not exposed to the program or some similar promotional effort?
- To what extent did participating retailers and other supply-side market actors promote and deliver efficient lighting and appliances? How do these practices compare to their behavior prior to enrolling in the program?

Process Evaluation. The key questions to be addressed in the process evaluation include the following.

- To what extent did program marketing efforts reach the targeted customers and supply-side market actors?
- How did customers and supply-side market actors use the program to help overcome barriers to the adoption/promotion of efficient lighting and appliances?

Recommendations for program improvement. Based on review of the analyses described above and experience in evaluating and operating other residential efficient equipment programs, XENERGY developed a set of recommendations designed to improve the performance and/or cost-effectiveness of the EPP.

E.1.3 Methods and Activities

To address the key research questions stated above, XENERGY undertook a broad range of research activities. In general, the methodological approach developed by XENERGY in consultation with DPS and other stakeholders involved the development of multiple observations on key indicators of program performance. Table E-2 summarizes the primary research and analysis activities undertaken for the EPP evaluation and presents some details regarding sample size and selection.

Introduction to findings and recommendations. As consumer products, light bulbs are quite different from appliances. They are much less expensive, less long-lived, and have lower operating costs. Moreover, the supply chains through which the two families of products reach consumers are quite different in terms of structure, the companies that inhabit the different levels, the roles of various groups in influencing customer decisions, and the broader interests of manufacturers. For these reasons, we present the results of the evaluation of the two components as if they were separate programs.

Table E-2
Summary of EPP Evaluation Primary Research and Analysis Activities

***Activity*/**Objectives	**Description/Sample Approach & Size**
SUPPLY-SIDE ANALYSIS	
Analysis of retailer stocking and pricing practices. • Develop observations over time of the number or percentage of program-qualified models available at retail outlets. • Develop information on types of products available over time. • Develop information on pricing of efficient products and incremental cost v. standard efficiency products.	• Data source: Appliance and lighting floor inventory data collected semi-annually by APT. • Appliances: Data available for 60 stores representing ~ 90% of all appliance VT. retailers. • Lighting: Data available for 100 stores: home centers, hardware, lighting specialty, discount department stores.
Retailer Survey In-depth interviews to probe: use of ENERGY STAR in marketing and sales; perception of the effects of the program on customers; sales and promotion practices for energy efficient products pre and post program.	• Appliance Sample: 12 stores selected to represent population in terms of size, location and type of store. • Lighting Sample: 12 stores selected to represent population in terms of size, location and type of store.
Appliance Mystery Shopper Scripted shopping trips to retailers to: gauge effectiveness of point of purchase display, sales staff initiative in selling efficient products, sales staff knowledge of efficient products, sales staff effectiveness in selling efficient products.	Mystery shopper visits made to 8 stores – subset of the appliance retailer interview survey.
DEMAND-SIDE ANALYSIS	
On-site Customer Survey Capture information on number, type, location of lighting fixtures; saturation and efficiency of appliances, opportunities for additional measures not yet offered, ENERGY STAR and program recognition	. Random sample of VT residents eligible for program using commercially-available listing service as the sample frame. 71 in-home surveys completed.
Pre-EVT Program Analysis Review reports of predecessor lighting programs to assess contribution to product adoption.	Sources include annual reports of utility energy efficiency program activities filed with DPS, market studies and evaluations.
SALES AND MARKET SHARE TRACKING	
Sales Data Analysis Obtain sales lighting and appliance sales data covering past several years from a representative group of stores in VT and comparable stores in areas without programs. Analyze sales data to estimate efficient product sales outside the program and assess extent of spillover.	Sources used include data collected from retailers in Vermont and Maine, rebate and coupon processing data maintained by APT and EFI, state and national appliance sales data maintained by the American Household Appliance Manufacturers and the DOE ENERGY STAR program.
PROCESS EVALUATION Assess effectiveness of program operations, identify opportunities and strategies for improvements.	Interviews with program staff, contractors, and retailers; review of program records and materials

E.2 LIGHTING COMPONENT

E.2.1 Key Findings

Volume of Customer Participation

The lighting component of the EPP did a very good job of reaching targeted customers and in encouraging them to use the program to purchase compact fluorescent bulbs and fixtures.

- ***Rapid increase in participation.*** During the eight years prior to transition to EVT management, utility operated residential lighting programs attracted total participation from roughly 73,500 customers, who purchased 162,000 bulbs and fixtures. In its first 34 months of operation, the EPP lighting component, 49,453 unique customers participated, purchasing 298,371 bulbs and fixtures. Observers attribute this rapid uptake in participation to a number of factors, including association of the ENERGY STAR label with compact fluorescent bulbs and fixtures, simplified procedures for retailers, and intensive public relations efforts in the first two years.
- ***High portion of fixture sales.*** For a variety of reasons, compact fluorescent fixtures have experienced low sales and market share. Therefore, the share of fixtures among all units sold through the program is a useful indicator of its market effects. Over the first 34 months of operation, customers purchased 60,649 fixtures through the program. This was 20 percent of all pieces of lighting equipment receiving incentives through the program and nearly 8 percent of all lighting fixtures sold in the state during the study period.[4]
- ***Downturn in first-time participants.*** As mentioned above, the number of customers participating in the program decreased by 19 percent between 2001 and 2002. However, the percentage of 'repeat customers' in the EVT program increased from 12.4 to 26.7 percent. This finding may indicate a number of different market developments. As discussed below, prices for CFL bulbs have come down, and customers may be willing to purchase them without a rebate. The finding may also indicate that the program is beginning to saturate the market segment of interested customers and may need to explore marketing strategies to attract consumers who have not yet tried efficient lighting products. Subsequent rounds of the evaluation will track this trend and research its underlying causes.

Retailer Participation

The program has consistently enrolled and supported a high percentage of the retail locations that carry compact fluorescent products. There are 148 hardware stores, discount department stores, home centers, and lighting specialty stores in Vermont. Of these 108 were found in the program coupon database. Several others have signed Memoranda of Understanding. However precise

[4] See Section 3 for a description of the estimate of total residential fixture sales in Vermont.

tracking of the number of stores that are active in processing coupons was complicated by inconsistencies in retailer identifying information stored in the database.

Market Effects: Net Bulb and Fixture Sales due to Program

XENERGY undertook the following data collection and analysis tasks to assess the effect of the program on CFL bulb and fixture sales.

- ***Analysis of CFL Bulb Sales and Rebate Data.*** Working with APT, XENERGY obtained and analyzed data on unit sales of CFL bulbs from five Aubuchon and five True Value hardware stores spanning last three quarters of 2000 and all four quarters of 2001. We also obtained sales records for CFL bulbs from seven stores in Maine: five Aubuchon locations and two True Value locations.
- ***Analysis of current saturation estimates.*** As part of this evaluation effort, XENERGY conducted a survey of 71 homes during the summer of 2002. The survey gathered detailed information on the number, room location, and type of fixtures and light bulbs.
- ***Comparison with point-of-sale data.*** XENERGY made use of quarterly estimates of sales of CFL bulbs in the United States and California based on analysis of check-out scanner data to assess the plausibility of sales and market share estimates developed from the local Vermont sources identified above.
- ***Comparison to results of similar studies.*** Recent studies in the Northwest have developed well-grounded estimates of CF bulb sales with and without rebates, based on sales data provided by a large sample of retailers participating in rebate and other promotional programs.

Using these data we developed estimates of total sales of CF bulbs for 2000 and 2001, as well as estimates of CF bulb saturation, and ran a number of consistency checks between these estimates.

The volume of CFL products sold in the sample of Vermont stores increased substantially between program inception in the first quarter of 2000 and the end of 2001. For the five Aubuchon stores in the sample, total sales of CF bulbs were 4,245 in the last three quarters of 2000 and 6,295 in 2001. According to store managers, unit sales in 1999 totaled roughly 1000.

A significant portion of total CFL purchases in Vermont sample stores were made without the benefit of program incentives. For the 10 hardware stores included in the sales record sample the weighted average of CFLs purchased without incentives was 56 percent. There are several questions yet to be resolved about the degree to which the sample represents the total market, the comparability of the sales data with the incentive data, and the accuracy of the data provided by the corporate office. Anecdotal information on total sales of CFL bulbs by Home Centers suggests that their portion of CFL bulb sales outside the program was significantly less than was found among

hardware stores. Home Centers accounted for 22 percent of CFL bulb coupon redemptions. This issue will be resolved through future evaluation efforts.

Saturation of CFL in Vermont households bulbs is high. Forty-nine percent of the households in the on-site survey had at least one CFL bulb installed, with a mean of 1.6 screw-in bulbs per customer, averaged over all households. The on-site sample included only homeowners. After adjusting for lower saturations for renters, we estimated that roughly 300,000 – 320,000 CFLs are currently installed in Vermont homes. This saturation level is far higher than estimates from previous market studies.

Estimates of unrebated sales. XENERGY used varying sales estimates to develop a stock replacement model to estimate the total number of compact fluorescent bulbs installed in 2002. The results of this exercise showed that current observed levels of CFL saturation were consistent with CFL bulb purchases without use of coupons in the range of 30 to 50 percent of total annual total sales. Evaluations of residential lighting programs conducted in the late 1990s found evidence of "outside program sales" in the range of 30 percent, based on the results of telephone surveys of random samples of customers. A recent study of a regional program in the Pacific Northwest estimated outside program sales in the range of 43 percent of the regional total in the last two quarters of 2001, based on analysis of sales data from stores in the program area.[5]

- ***Assessment of net program impacts on CFL bulb purchases***. The study collected a significant amount of data on CF bulb sales that suggest that the program had a strong positive effect on CF bulb purchases. In addition to the analysis of unrebated sales, data collected supported comparisons between the hardware stores in Vermont and Maine in the volume of CF bulb sales; comparison of sales before and after program inception in Vermont; and comparison of point of sale data between Vermont, California, and the rest of the country. These analyses all suggested that the program has had a strong net impact. However, in the absence of customer survey data on the influence of the program on customer purchase or more extensive cross-sectional analyses, we cannot develop a quantitative estimate of net program effects on CF bulbs sales.

  Energy savings associated with CFL bulb purchases represent a large portion of total savings for EVT's portfolio of residential programs. Therefore, development of methodologically sound estimate of total CFL bulb sales is critical to program evaluation efforts. Subsequent evaluation activities will focus on identifying and developing reliable sales estimates. Candidate data sources include an expansion of the sample of stores from which sales data are collected and purchase of check-out scanner data compiled by national market research organizations.

Program Effects on Retailer Stocking and Promotion of CF Products

- ***The availability and cost of ENERGY STAR CFL bulbs has substantially improved***. The variety of CFL bulb models stocked by each store increased by 22%, from 4.5 to 5.5, between early 2001 and the end of 2002. In addition, nearly six times as many models

[5] ECONorthwest. 2002. *ENERGY STAR Residential Lighting Program: Market Progress Evaluation Report*. Portland, OR. The Northwest Energy Efficiency Alliance.

now carry the ENERGY STAR label (82% of all models). Lastly, prices for ENERGY STAR models decreased by more than 13% during this time.

Availability of CFL torchieres has increased. Eighteen percent of participating stores stocked CFL torchieres, up from only 8% in early 2001

E.2.2 Process Evaluation and Recommendations

The findings presented in Sections 2, 3, and 4 show that the lighting component of the EPP was well designed to meet the objectives of increasing customer purchase and retailer support of compact fluorescent lighting products, both bulbs and fixtures. They also show that the program has been diligently executed, with a high level of attention to promotion and dealer support.

The findings reviewed above suggest that there are two areas in which EVT could take steps to improve the already good performance of the program.

Attract new customers to the program. Analysis of rebate records from 2002 indicate that the number of first-time participants in the program has fallen off by 32 percent from 2001 levels, These data may suggest that the program is reaching saturation for the most interested customer segments, and that actions need to be taken to broaden its reach. EVT has already taken a several steps in this direction, including sending catalogs via direct mail to customers who have not yet participated and to those who live in remote areas. Other tactics to reach new customers could include staging promotions in or near retail outlets such as supermarkets. These kinds of retail establishments attract customers who simply do not frequent the kinds of establishments such as home centers and hardware that stock and sell large volumes of CFLs.

Target remodelers for promotional efforts. The findings also suggest that the use of CFL fixtures by remodelers remains low. Remodeling projects account for nearly one-fourth of permanent fixture purchases. To reach this market, we recommend the following.

- ***Develop a remodeler efficient lighting package.*** Such a package might be similar to the bundle of lighting measures developed for the new construction program, accompanied by a rebate and materials that can be used to inform remodeling customers of the benefits of CF fixtures.
- ***Conduct a direct-mail program to remodelers to publicize the availability of the remodeling lighting package.***

E.3 APPLIANCE COMPONENT

Volume of Customer Participation

Efficient clothes washers can provide significant energy savings in water heating and drying. For this reason, Vermont utilities as early as 1997 began offering incentives for their purchase. Dealer services to support sales other efficient appliances, including dish washers, refrigerators, and room air conditioners, has been consistently linked to washing machine incentives. This support has included sales staff training, point-of-purchase marketing materials, and special promotions or contests for ENERGY STAR qualifying appliances. The linkage between the incentive offer for clothes washers and promotion of other appliances without the use of incentives has encouraged the stocking and sales of all efficient appliances even though incentives have not been generally available for them.

The design of the program has made it relatively easy to track its impact on clothes washers compared to the other appliance. For this reason, much of the following discussion is focused on clothes washers.

The utility-sponsored predecessor "TumbleWash" program provided mail-in rebates for approximately 1950 efficient clothes washers in 1998 and 2,680 washers in 1999. Comparison of program activity to shipment data from the Association of Home Appliance Manufacturers (AHAM) suggests that practically all purchases of resource-efficient clothes washers in these years received incentives through the program. The annual number of units rebated held fairly constant from 1999 through 2002, at roughly 2,500, or about 20 percent of all clothes washer sales in the state.

Retailer Participation

Comparison of program records to Dun & Bradstreet data on the number of mass merchandisers and appliance stores show that practically all businesses that sell appliances in Vermont are enrolled in the program. Participation is defined as signing a Memorandum of Understanding maintaining point of purchase displays, receiving training, offering incentives, and permitting periodic inventories of qualifying products. This is a significant accomplishment that can be attributed to the design of the programs and the efforts of implementers over time.

Operation of Appliance Markets

Analysis of data on ENERGY STAR model availability, appliance sales, rebates processed, and models displayed from chain and independent retailers provided a number of key insights into the operation of Vermont's appliance markets during the program period. The following paragraphs summarize this analysis.

Table E-3
Overview of Key Market Indicators Appliance and Year

	1999	2000	2001
CLOTHES WASHERS			
Number of ENERGY STAR Models Available	35	64	84
Vermont ENERGY STAR Percent Models Displayed*			
Chain	12%	17%	19%
Independent	26%	29%	31%
All Stores in Sample	22%	25%	28%
Vermont ENERGY STAR Market Share			
Chain	14.5%	22.6%	22.6%
Independent	28.0%	31.0%	37.0%
Weighted Average	26.3%	27.3%	32.3%
US Market Share (Chains)	8.5%	9.3%	10.3%
REFRIGERATORS			
Number of ENERGY STAR Models Available	331	301	58
Vermont ENERGY STAR Percent Models Displayed			
Chain	31%	45%	32%
Independent	14%	23%	11%
All Stores in Sample	21%	30%	20%
Vermont ENERGY STAR Market Share			
Chain	28.1%	31.0%	14.9%
Independent	12.0%	13.0%	8.0%
Weighted Average	19.4%	21.2%	11.2%
US Market Share (Chains)	24.4%	27.0%	17.3%
DISHWASHERS			
Number of ENERGY STAR Models Available	173	265	158
Vermont ENERGY STAR Percent Models Displayed			
Chain	13%	23%	28%
Independent	36%	49%	43%
All Stores in Sample	31%	41%	41%
Vermont ENERGY STAR Market Share			
Chain	7.5%	8.1%	14.8%
Independent	51.0%	58.0%	64.0%
Weighted Average	34.7%	39.4%	45.6%
US Market Share (Chains)	12.4%	10.9%	19.9%

* According to market observers interviewed for the evaluation, the inventory on display closely reflects the inventory in warehouses.

The markets for clothes washers, dishwashers, and refrigerators need to be analyzed separately. Federal and ENERGY STAR standards changed at different times and degrees for clothes washers, refrigerators, and dishwashers, and that pattern will continue. Different segments of the retailer channel appear to take different approaches to stocking and selling ENERGY STAR models of the various appliances. Independent retailers stocked and sold significantly higher percentages of ENERGY STAR clothes washers and dishwashers than chain outlets. This relationship was reversed for refrigerators and room air conditioners. This pattern was also identified by studies in California.

Product availability was extremely volatile during the baseline and early program periods. Whereas the number of ENERGY STAR-qualified clothes washer models increased regularly over the period 1999 – 2001 (and into 2002), the number of qualifying refrigerators, dishwashers, and room air conditioners fluctuated widely during the period. This was due, in part, to the introduction of new ENERGY STAR specifications and changes in the federal standards for refrigerators.

Retailers exercise a great deal of discretion over stocking and promotion. Virtually all appliance store and appliance department managers interviewed reported that they personally made inventory purchase, display, and pricing/promotion decisions locally. As Table E-3 shows, the percentage of ENERGY STAR models stocked varies much less from year to year than do the number of models available or ENERGY STAR market share. To some extent, this relative stability reflects the physical limitations of showroom floors, the need to display a range of models, and niche marketing strategies among independents.

Assessment of Net Program Effect on ENERGY STAR Appliance Purchases

Basic Approach. To assess the net effect of the EPP on the market share ENERGY STAR appliances in Vermont, XENERGY estimated a regression model of market share of an ENERGY STAR appliance at the state level by appliance type and year. The independent variables in the model included the state's median income in 2000, the percentage of individuals over 25 with a Bachelors degree, and the presence of appliance incentive programs available to the majority of households in the state. The dependent variable was the state's ENERGY STAR market share for a specific appliance and year, as measured by the U. S. Department of Energy's sales tracking system. This system covers only large national chain retailers.

We estimated the model for each appliance in each year 1999 – 2001 for which complete data were available ENERGY STAR market share. Complete data were available for all years and appliances except room air conditioners in 1999. We then took the following steps to generate estimates of the net effect of the Vermont EPP on ENERGY STAR market share for each appliance and year.

1. Examine the model results to assess its suitability for estimating ENERGY STAR market share. This involved examining the sign and statistical significance of the coefficients and the portion of total variation in ENERGY STAR market share that the model accounted for (R^2). The model was accepted for further use in the analysis if the coefficients were

statistically significant at the 10 percent probability level and had the expected signs, and if the *F* statistic for the model exceeded the critical value.

2. Apply the model results to estimate Vermont's ENERGY STAR market share with and without the presence of the program. This involved enumerating the model with Vermont's demographic variables with the indicator variable for the presence of the program set at 1, then at 0.
3. Estimate the net effect of the program on the market share of ENERGY STAR appliances sold by retailers reporting to the DOE sales tracking system. This effect was estimated by the difference between the actual market share and the estimated share with the program indicator variable set to 0. This value represents statistically what the Vermont market share for the subject appliance would have been if the program had not been available, taking into account the market share in the 49 other states with their different programs and demographic conditions.
4. Adjust the net program effect on market share to account for differences in Vermont between the chain retailers represented in the DOE database and independents in the percentage of ENERGY STAR appliances sold, by appliance type and year.

Summary Results of the Net Effects Analysis

Table E-4 summarizes the results of the modeling effort described above for 2000 and 2001, the years in which the EVT program was in operation. The following paragraphs explain these results and provide our recommended estimates of net program effects on ENERGY STAR appliance market share.

Table E-4
Net Impacts of the EPP: Unit Sales and Energy Savings

		Net Program Effects		
Appliance/Year	**Observed E STAR Share**	**Adjusted Difference in Market Share***	**Sales in Units**	**Energy Savings MWH/Year**
Clothes Washers				
2000	27.3%	15.1%	1,577	946
2001	32.3%	13.9%	1,741	1,045
Dishwashers				
2000	39.4%	0.0%	-	
2001	45.6%	7.3%	620	90
Room Air Conditioners				
2000	22.0%	2.5%	178	13
2001	19.8%	0.2%	14	1

*Difference between the model estimate with the program variable set to 0 and the observed share for chain stores adjusted to reflect the relative volume of sales and market share of ENERGY STAR models among independent retailers in VT.

Clothes washers. In 2000, the model estimate (with the program statistically accounted for) was significantly below the observed figure, 16.5 percent v. 22.6 percent, a difference of nearly 30 percent. We nonetheless concluded that the difference between the observed level and the model estimate with the program variable set to 0 was a fair estimate of net program impacts in 2000. The main factor we considered in making this judgment was that Vermont consumers generally had not purchased other ENERGY STAR appliances that offer fewer economic advantages in greater proportion than consumers nationwide. In 2001, the model estimate of chain store market share was quite close to the actual figure: 20.1 percent v. 22.6 percent. We concluded that the difference between the observed ENERGY STAR market share and the model estimate without the program was a fair representation of the net effects of the program in 2001.

Thus, applying the methods described above, we estimate that the EPP accounted for a net difference in Vermont's market share of ENERGY STAR clothes washers of 15.1 percent (1,577 units) in 2000 and 13.9 percent (1,741 units) in 2001. In 2002, actual market share of ENERGY STAR clothes washers sold by stores reporting to the DOE system was 33.5 percent, versus a model estimate of 27.9 percent. This result is somewhat surprising in light of the slight downturn in the number of rebates issued between 2001 and 2002. It indicates that acceptance of ENERGY STAR clothes washers is growing more rapidly among customers in Vermont than in other states that operate clothes washer rebate programs.

Dishwashers. The model did a good job of predicting the actual market share for ENERGY STAR dishwashers in Vermont. The model estimate for 2000 was 9.5 percent v. the actual 8.1 percent; 15.3 v. 14.8 percent in 2001. We concluded that the comparison of the actual market share to the model estimate with the program variable set at 0 was a reasonable estimate of net market effects. In 2000, this difference was – 1.4 percent. We therefore set the net program effect on ENERGY STAR dishwasher sales to zero for 2000. In 2001, after making adjustments for sales by independents, the net contribution of the EPP to ENERGY STAR dishwasher market share was 7.3 percent. In 2002, the market share model did not yield statistically significant results. Vermont's ENERGY STAR market share, at least among retailers reporting sales to DOE, was 27.5 percent versus 36.4 percent for the nation as a whole. However, the market share among Vermont retailers reporting to DOE nearly doubled between 2001 and 2002, so some progress on selling ENERGY STAR dishwashers has clearly been made.

Room Air Conditioners. The room air conditioner models did a good job of predicting actual ENERGY STAR market share in 2000 and 2001. Our overview of the room air conditioner market share data suggested that the impact of promotion programs on ENERGY STAR model adoption was rather small in 2000 and 2001, and this was born out by the model results. However, in 2002, EVT offered rebates for ENERGY STAR qualified air conditioners. The market share for qualifying models leapt to 61.3 percent from 19.8 percent in the previous year. The model estimated market share was 47.6 percent. Thus, as was the case with clothes washers, Vermonters responded much more vigorously to program incentives than did customers in other states, even those such as Connecticut and New York, which had rebates targeted to ENERGY STAR air conditioners.

Refrigerators. Vermont's ENERGY STAR market share for refrigerators has been highly erratic, both in absolute level and in relationship to the national and regional figures. In 1999 and 2000, Vermont's market share was relatively high – 28 to 31 percent. This was slightly higher than the national average and 50 to 70 percent higher than the share in other states in which the NEEP program was operating. In 2001, however, Vermont's market share dropped to 14.9 percent, below the national average and well below the levels in the other NEEP states. Thus, in 2000 and 2001, we attribute no effect to the program on market share.

In 2002, a number of states including Vermont, Connecticut, and California offered rebates for ENERGY STAR qualified refrigerators. The model yielded statistically significant results. The observed market share of qualified refrigerators in Vermont was 24.8 percent versus a model-estimated share of 22.9 percent. These results suggest that the program had an effect on market share. However, given that independent retailers who do not report to the DOE sales tracking system have historically sold a lower portion of ENERGY STAR models than the retailers that do report, sales data from independents will be required to support a more definitive assessment of the program effects.

E.3.2 Process Evaluation and Recommendations

Findings

Retailer response to the program. Retailers interviewed for this evaluation gave consistently high marks to EVT and APT for all aspects of program administration and support: product placement, sales force training, and rebate processing. On a scale of one to five, with one being "very poor" and five being "very good", a sample of retailers rated Efficiency Vermont's services at 4.5 for assistance with in-store promotions, 3.4 for training, and 4.8 for rebate processing. The same sample rated the importance of stocking ENERGY STAR appliances in relation to their overall business goals at 7.9 on a scale of one to ten.

Retailer practices. Mystery shopper visits conducted for the evaluation found that the sales staff effectively promoted ENERGY STAR clothes washers, for which rebates were available, but did little to promote the other appliances addressed by the program. Moreover, their general level of knowledge concerning the meaning and interpretation of the EnergyGuide and ENERGY STAR labels were low, and their representation of various models as ENERGY STAR-compliant was occasionally inaccurate. For example, only 8 percent of the refrigerators that were represented as energy efficient actually qualified for the ENERGY STAR label. We note, however, that sales staff's general level of knowledge about ENERGY STAR and the benefits of efficient appliances has increased significantly since 1999, when a Vermont baseline research effort also conducted Mystery Shopper visits.

There are a number of potential explanations for the finding that salespersons were much more enthusiastic and effective at selling ENERGY STAR clothes washers than the other covered appliances.

- Resource-efficient clothes washers have been eligible for rebates in Vermont since 1997, whereas other appliances have not been eligible for rebates.
- With recent changes in federal standards, the difference in energy consumption between standard and ENERGY STAR refrigerators and dishwashers is meager.
- Salespeople focused their attention and energy on learning about equipment that was eligible for rebates, which help overcome customer objections to higher initial cost.

Recommendations

As discussed in Section 6 of the full report, the four appliances supported by the ENERGY STAR appliance program are subject to very different market dynamics on both the consumer and supplier sides. We therefore develop our recommendations in regard to the separate appliances rather than for the program as a whole.

Clarify program design in regard to refrigerators, dishwashers, and room air conditioners. The results of the analysis in Section 6 suggest that the program is having relatively little effect on retailer practices or customer purchases in regard to refrigerators, dishwashers, and room air conditioners. The findings also suggest that the circumstances that lead retailers to promote ENERGY STAR models (or not) differ between independents and chain establishments, and that these circumstances may differ between independents in various niche markets. Given these findings, XENERGY believes it would be worthwhile to gather information from retailers regarding their motivations and barriers to promoting specific ENERGY STAR appliances, to brainstorm program ideas that might result in a more consistent level of effort, and to review the proposed program initiatives that emerge from this process. The process of gathering information could be conducted within the context of the next round of evaluation, and could take the form of in-depth interviews or focus groups. We recommend that EVT and APT staff participate in the process, as well as selected retailers.

We should note that EVT has already taken steps to strengthen program support for refrigerators and room air conditioners. These steps include initiation of rebate offers for those appliances and provision of help to retailers in identifying qualifying products at various price points to meet customer needs and preferences.

Clothes Washers: Retention of customer incentive. Given the growing market share of ENERGY STAR clothes washers nationwide, the high volume of purchases outside the program in Vermont, and the impending increase in federal minimum efficiency standards, it may seem tempting to remove or reduce the incentive. We believe that retention of the incentive for 2003 is warranted for a number of reasons. First, the net effects analysis estimated that the program stimulated purchase of 1,741 ENERGY STAR units in 2001, compared to program sales of 2,563. This suggests that a large portion of the customers who are interested in resource-efficient washers still need the incentive to help them overcome objections to the high incremental cost. Also, in the case of products such as refrigerators and electric motors, promulgation of new federal standards was preceded by steep price cuts in lower-end products as manufacturers and

distributors dumped non-complying inventory. This will likely happen in the clothes washer market as well. Incremental costs are likely to increase as 2004 approaches, so it will be a good idea to leave the incentive in place.

E.3.3 Additional Appliance-Related Savings Opportunities

Analysis of the on-site survey data identified the following opportunities for significant energy savings in appliances.

- ***Early retirement of refrigerators and freezers.*** Based on the results of the survey, we estimate that there are over 80,000 refrigerators and 76,000 standalone freezers currently in use in Vermont homes that are older than their engineering useful life – 14 years. The metered use of units from this vintage averages over 2000 kWh per year, versus 550 – 1000 kWh per year for comparable new units of standard efficiency.[6] Moreover, nearly 15 percent of the refrigerators installed were second units, most of which were in continuous use. The considerable gross energy savings available from removal or replacement of very old units, combined with the large number of applicable units identified suggest that further development of refrigerator retirement program details and measure screening efforts are justified.
- ***Energy Star freezer promotion.*** The Department of Energy is currently considering adding stand alone freezers to the roster of products eligible to receive the ENERGY STAR label. The labeling specifications under consideration would result in unit energy savings of 40 – 60 kWh per year for the most common sized models. Freezer shipments have been rising recently and, should the ENERGY STAR specification be promulgated, it may be worthwhile to support freezers as part of the EPP.

[6] See XENERGY Inc. (1998). *Impact Evaluation of the Spare Refrigerator Recycling Program Final Report.* Prepared for Southern California Edison, San Dimas, CA.

1 INTRODUCTION

1.1 OVERVIEW

This is the Final Report of the Phase 1 Evaluation of Efficiency Vermont's (EVT's) Efficient Products Program (EPP). The overall goal of the EPP is to increase the market share of efficient residential lighting equipment and appliances through a combination of customer incentives, retailer support, and broad-based marketing. This evaluation assesses the accomplishments of the program from its inception in March 2000 through May 2002.

1.1.1 Program Description and Operations through May 2002

Program Objectives. The objectives of the EPP, as stated in the original program plan, are to:

- Increase market recognition of ENERGY STAR® labeled products;
- Increase the level of awareness and knowledge of consumer benefits of compact fluorescent lighting and energy-efficient appliances;
- Increase the level of customer adoption of efficient residential lighting and appliances;
- Increase retailer and dealer stocking and promotion of efficient residential lighting and appliances;
- Increase use of efficient lighting and appliances in multifamily and institutional residential markets.

Program Development. Both the lighting and appliance components built on predecessor utility programs that served most of Vermont's residential electric customers. Vermont electric utilities had offered programs to promote the purchase and use of compact fluorescent bulbs and, later, fixtures more or less continuously since 1994. In late 1998, all of the Vermont joined in a statewide rebate program based on the regional "StarLights" approach developed by the Northeast Energy Efficiency Partnerships (NEEP). All of the major Vermont utilities except Washington Electric Coop had offered incentives for the purchase of resource efficient clothes washers beginning in late 1997. Most joined in the NEEP coordinated ENERGY STAR appliance program in 1999. This program promoted efficient refrigerators, dishwashers, and room air conditioners, as well as clothes washers. The transition to EVT management was characterized by a great deal of continuity. EVT hired the residential program manager from Green Mountain Power to manage the EPP; the major program contractors were retained; as was much of the basic program design. The lighting component went into operation in March 2000. EVT took over administration of the clothes washer rebate operations in January 2000.

Program Design and Operations. The following paragraphs describe the key features of the lighting and appliance components of the EPP. See Section 2 for a detailed description of the development and operation of the lighting component and Section 5 for details of the appliance component.

- ***Customer Services and Incentives: Lighting.*** The lighting component offers instant rebate coupons for the purchase of ENERGY STAR-qualified compact fluorescent bulbs and fixtures. Rebate levels for compact fluorescent bulbs were initially set at $8; they were lowered to $7 by June 2000, then to $4 by end of 2001. In June 2000, the program was opened to commercial as well as residential customers. Customers were permitted to purchase 6 bulbs and 4 fixtures at one time. Non-torchiere light fixture rebates were initially set at $20 and reduced to $15 during 2001. In addition to instant rebates, the program has sponsored a number of special events to promote and sell efficient lighting products, including a number of torchieres turn-ins. Customers could also purchase compact fluorescent bulbs and fixtures at discounted prices through a catalog mailed to all residential customers. Catalog sales represented roughly 3 percent of units sold or rebated through the program.
- ***Customer Services and Incentives: Clothes Washers.*** All electric customers are eligible to receive incentives for the purchase of ENERGY Star-qualified clothes washers. Rebates were initially set at $100 and lowered to $75 during the first program year. They were reduced in June 2001 to $50.
- ***Retailer Services.*** The program offers a number of services to retailers participating in the program, including installation of point of purchase displays, assistance in ordering and stocking qualifying products, and sales staff training. In addition to clothes washers, the program provided marketing support (but no customer incentives) for ENERGY STAR-qualified dishwashers, refrigerators, and room air conditioners. Incentive processing for clothes washers and retailer support services are provided by Applied Proactive Technologies, Inc.
- ***Marketing.*** EVT participates in the national ENERGY STAR brand recognition effort, undertakes local advertising, and stages special promotion events to support program activities.
- ***Administration.*** The program is administered by EVT staff, who are responsible for overall program design and operation, as well as coordination with ENERGY STAR and Northeast Energy Efficiency Partnerships, a regional organization that supports local energy efficiency programs. EVT contracts for a number of key program functions. Applied Proactive Technologies (APT) provides retailer support services. The Energy Federation, Inc. (EFI) furnishes lighting coupon processing and catalog fulfillment services. APT and EFI played these roles in predecessor programs operated by the Vermont utilities.

Program Operations through May 2002. TABLE 1-1 summarizes key indicators of program activity for the first two years of program operation.[1]

Table 1-1
Summary of EPP Program Activities

Component/ Year	# of Stores Enrolled	# of Participants (Rebate Recipients)	# of Rebates Issued	Other Program Activities
APPLIANCES				
2000	60	2,476	2,476	Participation in national and regional ENERGY STAR promotion activities.
2001	91	2,563	2,563	Participation in national and regional ENERGY STAR promotion activities.
2002 (thru 5/29)	91	787	787	Participation in national and regional ENERGY STAR promotion activities.
Total	**91**	**5,876**	**5,876**	
LIGHTING				
2000	105	13,608	Bulbs: 56,511 Fixtures: 22,887	Torchiere Turn-in: 3,000 halogen torchieres exchanged; 5,300 bulbs and 400 fixtures sold.
2001	108	24,342	Bulbs: 86,353 Fixtures: 22,294	36 Special Events: Torchiere turn-ins, home show booths, in-store promotions.
2002 (thru 5/29)	125	19,802	Bulbs: 95,517 Fixtures: 15,522	
Total	**125**	**49,453**	**Bulbs: 237,722** **Fixtures: 60,649**	

Program activities in perspective. Both the lighting and washer components of the EPP achieved strong levels of customer participation in their first 27 months of operation. The number of unique participants in the lighting program totaled 16.5 percent of all permanent housing units in the state. This participation rate is consistent with that of similar programs recently launched in the Northeast and is considerably higher than those achieved by predecessor programs in Vermont. The EPP has also done a particularly good job in selling compact fluorescent fixtures. Over 20 percent of the units sold through the program were fixtures, as opposed to bulbs. This is far higher than the fixture volume achieved by similar programs. Moreover, the 22,000+ fixtures sold through the program in 2000 and 2001 represent nearly 7 percent of *all* fixtures purchased by residential customers in Vermont in those years. Analysis of sales and saturation data presented in Section 3 indicate that that the programs influenced customers to purchase a high volume of compact fluorescent bulb purchases without applying for incentives.

[1] The program was launched in March 2000.

From its inception, the EVT clothes washer program has consistently accounted for roughly 20 percent of all unit sales in Vermont. Predecessor programs operated by the Vermont electric utilities reached this level of participation in 1999. However, a variety of evidence gathered for this evaluation from sales data and on-site surveys suggests that purchases of resource-efficient clothes washers by nonparticipating customers have increased steadily since 2000.

1.2 OVERVIEW OF THE PHASE 1 EPP EVALUATION

XENERGY, the Vermont Department of Public Service (DPS), and a group of stakeholders developed the scope of the Phase 1 EPP Evaluation through an iterative process through which both the evaluation objectives and methods were refined. This process produced a number of interim documents including:

- ***Preliminary Market Characterization (September 2001).*** This document compiled information from in-depth interviews with local market participants, program staff, and program contractors, as well previous research results to develop a preliminary portrait of the size and structure of Vermont's residential lighting and appliance markets. The documents also summarized existing findings regarding the share of efficient equipment in those markets and the barriers to its further acceptance.
- ***Final Evaluation Plan (January 2002).*** Based on extensive discussions with representatives of DPS and EVT concerning the *Preliminary Market Characterization* and various draft research plans, XENERGY developed a final evaluation plan that provided the objectives and methods for the analysis reported here.

1.2.1 Objectives

The key objectives of the Phase 1 EPP Evaluation are as follows.

Characterization of Baseline Conditions. The primary research questions addressed by the baseline characterization are:

- How large are the residential markets for compact fluorescent bulbs, lighting fixtures, and the four appliances covered by the program?
- What are the principal segments of the customer market and supply chains for those products?
- What were the conditions of the residential lighting and appliance markets around the time the EVT programs began in regard to supply-side actor promotion and customer acceptance of efficient products?

Assessment of Program Market Effects. Assessment of the program's effects on the targeted market actors is complicated in that it requires the collection of information that is difficult to get, as well as a significant amount of judgment in its interpretation. Analysis of market effects

requires not only thorough accounting of what participating retailers and customers did in regard to the targeted measures, but also a compilation of information on what customers and supply-side market actors did "outside the program". Once that information is in hand, it must be viewed from a number of angles to support inferences concerning the "net effects" of the program. This exercise requires consideration of the counterfactual situation of what customers would likely have done in the absence of the program. The key research questions to be addressed in assessing market effects include:

- To what extent did participating and nonparticipating customers adopt efficient lighting equipment and appliances? How does their level of adoption compare to customers in similar situations who were not exposed to the program or some similar promotional effort?
- To what extent did participating retailers and other supply-side market actors promote and deliver efficient lighting and appliances? How do these practices compare to their behavior prior to enrolling in the program? to the actions of similar businesses that were not exposed to a similar program?
- What are the key motivations and barriers that customers face in regard to adopting efficient products? that supply-side actors face in regard to promoting and delivering them? To what extent did the program address these barriers?

Process Evaluation. The key questions to be addressed in the process evaluation include the following.

- To what extent did program marketing efforts reach the targeted customers and supply-side market actors?
- How did customers and supply-side market actors use the program to help overcome barriers to the adoption/promotion of efficient lighting and appliances?

Recommendations for program improvement. Based on review of the analyses described above and experience in evaluating and operating other residential efficient equipment programs, XENERGY developed a set of recommendations designed to improve the performance and/or cost-effectiveness of the EPP. XENERGY presented these recommendations to DPS, EVT, and the program contractors to gather their perceptions regarding the practicality and likely effectiveness of the proposed actions. The recommendations presented here represent reflect XENERGY's independent judgment concerning prudent next steps in program development.

1.2.2 Methods and Activities

This section provides an overview of the full range of research and analysis activities undertaken for this evaluation. Detailed descriptions of various activities, including statistical principles, response rates, and limitations on interpretation are presented in subsequent sections where results are presented. Appendices A and B present additional methodological details.

In general, the methodological approach developed by XENERGY in consultation with DPS and other stakeholders involved the development of multiple observations on key indicators of program performance. Ideally, baseline characterization would consist of a set of replicable observations of key market characteristics, such as stocking and pricing patterns for products in question, customer awareness and knowledge of product, and customer acceptance in terms of sales or market share of products in question. Information on a limited range of these topics was available from baseline studies conducted in 1999. Therefore, we needed to make best efforts to synthesize a reasonable picture of baseline conditions out of available information and research conducted specifically for this evaluation. This primary research included collection of data on sales of lighting products in Maine, review of shelf inventories conducted towards the beginning of the EVT program, and analysis of data collected in on-site surveys of existing homes.

Similarly, an ideal characterization of market effects would include multiple observations on key variables such as market share of efficient products at different times subsequent to program inception, and market actor perceptions of program effects. However resource limitations precluded this kind of comprehensive "triangulation" in most cases. DPS and other stakeholders – with input from XENERGY – made decisions as to the allocation of resources for primary data collection with eye to greatest value for program evaluation and improvement at this juncture. Thus, for example, we invested in collection of sales data from a relatively small number of stores in Vermont and Maine, as well as the on-site surveys to assess program impact on customer acceptance of efficient lighting products and appliances. Other frequently-used methods to assess program effects, such telephone surveys of a broad sample of customers, were foregone at this stage.

Table 1-2 summarizes the primary research and analysis activities undertaken for the EPP evaluation and presents some details regarding sample size and selection. Table 1-3 shows the key evaluation questions to which the results of the various research and analysis activities were applied.

Table 1-2
Summary of EPP Evaluation Primary Research and Analysis Activities

Activity/Objectives	**Description/Sample Approach & Size**
SUPPLY-SIDE ANALYSIS	
Analysis of retailer stocking and pricing practices. • Develop observations over time of the number or percentage of program-qualified models available at retail outlets. • Develop information on types of products available over time. • Develop information on pricing of efficient products and incremental cost v. standard efficiency products.	• Data source: Analyze and lighting floor inventory data collected semi-annually by APT. • Appliances: Data available for 60 stores representing ~ 90% of all appliance VT. retailers. • Lighting: Data available for 100 stores: home centers, hardware, lighting specialty, discount department stores.
Retailer Survey In-depth interviews to probe: use of ENERGY STAR in marketing and sales; perception of the effects of the program on customers; sales and promotion practices for energy efficient products pre and post program.	• Appliance Sample: 12 stores selected to represent population in terms of size, location and type of store. • Lighting Sample: 12 stores selected to represent population in terms of size, location and type of store.
Appliance Mystery Shopper Scripted shopping trips to retailers to: gauge effectiveness of point of purchase display, sales staff initiative in selling efficient products, sales staff knowledge of efficient products, sales staff effectiveness in selling efficient products.	Mystery shopper visits made to 8 stores – subset of the appliance retailer interview survey.
DEMAND-SIDE ANALYSIS	
On-site Customer Survey Capture information on number, type, location of lighting fixtures; saturation and efficiency of appliances, opportunities for additional measures not yet offered, ENERGY STAR and program recognition	. Random sample of VT residents eligible for program using commercially-available listing service as the sample frame. 71 in-home surveys completed.
Pre-EVT Program Analysis Review reports of predecessor lighting programs to assess contribution to product adoption.	Sources include annual reports of utility energy efficiency program activities filed with DPS, market studies and evaluations.
SALES AND MARKET SHARE TRACKING	
Sales Data Analysis Obtain sales lighting and appliance sales data covering past several years from a representative group of stores in VT and comparable stores in areas without programs. Analyze sales data to estimate efficient product sales outside the program and assess extent of spillover.	Sources used include data collected from retailers in Vermont and Maine, rebate and coupon processing data maintained by APT and EFI, state and national appliance sales data maintained by the American Household Appliance Manufacturers and the DOE ENERGY STAR program.
PROCESS EVALUATION Interview program staff, contractor representatives, and other stakeholders to assess program operations.	

Table 1-3
Application of Research and Analysis Results

		In-depth Interviews		Sales Data Analysis		Primary Retailer Data			
EVALUATION COMPONENT/Research Topic or Question	Rebate Records Analysis	Prog. Staff/ Contr.	Retail-ers	Primary	Secon-dary	Mystery Shopper	Shelf Inven-tories	Customer On-site Surveys	Pre-EVT Reports
BASELINE CHARACTERIZATION (PRIOR TO EVT PROGRAMS)									
Saturation of efficient products								X	X
Availability and pricing of efficient products		X	X						X
Market (sales) share of efficient products		X	X		X			X	X
Customer recognition and knowledge of efficient products		X	X						X
Retailer perceptions of efficient products and commercial value of their promotion		X	X						X
ASSESSMENT OF PROGRAM EFFECTS									
Changes in efficient product saturation									
Changes in efficient product market share	X	X	X	X	X				
Changes in customer recognition and knowledge		X	X					X	
Changes in efficient product availability and pricing		X	X	X	X	X	X		
Changes in retailer perception of efficient products and the commercial value of carrying them		X	X					X	
PROCESS EVALUATION									
Effectiveness of program marketing	X	X	X			X			X
Level of retailer and sales support for efficient products		X	X			X	X		
Appropriateness of program record-keeping and tracking systems	X	X	X						
Appropriateness of incentive levels; specifications for qualifying equipment	X			X	X	X		X	

1.3 GUIDE TO THE REMAINDER OF THE REPORT

As consumer products, light bulbs and fixtures share few characteristics with appliances. They are much less expensive, less long-lived, and have lower operating costs. Moreover, the supply chains through which the two families of products reach consumers are quite different in terms of the structure of the supply chain, the companies that inhabit the different levels, the roles of various groups in influencing customer decisions, and the broader interests of manufacturers. For these reasons, we have found it easier to present the evaluations of the lighting and appliance components as if they were essentially two separate programs. Thus, for the each of the two components, we present a sequence of three chapters covering the following topics:

- ***Summary of program activities.*** These sections present the chronology of program development, including activities and accomplishments of predecessor programs. They also provide a detailed analysis of patterns of program participation by customers and retailers.
- ***Characterization of Baseline Conditions and Program Market Effects.*** These sections summarize information on the baseline conditions of the supply and demand side of the targeted markets at the time the EVT programs began, focusing on levels of saturation and market share, product availability and retailer support, and customer knowledge of the targeted products. The analysis continues by assembling evidence on changes in these market conditions over the course of the program and the degree to which these changes can be attributed to the program.
- ***Process Evaluation.*** These sections summarize information on customer and retailer perceptions of the program and the specific ways in which customers and retailers used the program to overcome barriers to broader acceptance of the targeted products. These sections conclude with recommendations to improved project operation.

This report concludes with a section that summarizes the findings of the on-site survey of existing homes in regard to energy efficiency opportunities that may justify the development on new programs or the offering of new measures and services through existing programs. This analysis is undertaken primarily to support the "Emerging Program" efforts of EVT.

We provide the following documentation of research methods in appendices.

- ***Appendix A: Questionnaires and Interview Guides.*** Final versions of all questionnaires and in-depth interview guides used in the evaluation.
- ***Appendix B: On-site Inspection Form and Customer Questionnaire.*** Inspection form and customer questionnaire used for the on-site inspections of 71 existing homes.
- ***Appendix C: Documentation of Net Effects Model.*** Complete description and results of regression models used to estimate the net effects of the EPP on efficient appliance purchases.

2 LIGHTING COMPONENT DESCRIPTION

2.1 PROGRAM DEVELOPMENT

2.1.1 Predecessor Programs

The major Vermont investor-owned and municipal utilities began offering programs to promote efficient residential lighting in the early 1990s. These efforts featured many of the same kinds of customer incentives and retailer support services that characterize the EVT program. In 1998, all Vermont utilities joined in the regional StarLights residential lighting program initiatives supported by the Northeast Energy Efficiency Partnerships. This initiative featured a uniform approach to qualifying products for program support, a regionwide advertising campaign, a consistent approach to retailer support, and coordination with the federal ENERGY STAR program. APT and EFI were engaged to carry out the retailer support and fulfillment functions they now provide for the EVT program. Table 2-1 shows the numbers of CF bulbs and fixtures for which rebates were paid by Vermont utilities in the years prior to the EVT program, along with brief descriptions of the programs in place during those years.

We note that the Vermont utilities operated other residential programs that installed compact fluorescent bulbs directly in customers' homes. These activities were generally a part of programs targeted to low-income or high use customers. Over the 8 years for program records were available, about 75,000 customers participated in these programs. We do not count the bulbs installed through these programs in estimating sales unit sales.

Table 2-1
Summary of Predecessor Residential Lighting Retail Program Activity

	Indicators of Program Activity			
Year	**Customers**	**Bulbs**	**Fixtures**	**Key Events**
1992 – 1994	31,502	78,036	-	Mail-in rebates in use
1995	12,480	29,382	108	Mail-in rebates in use
1996	n/a	13,000	n/a	Partial count
1997	9,801	16,455	3,258	Mail-in rebates in use
1998	10,000	17,000	n/a	GMP adopts NEEP regional "StarLights" program approach. APT and EFI engaged. APT enrolls 52 stores in program statewide.
1999	9,734	21,000	2,300	Change to instant cash coupons at GMP. StarLights program available statewide. Numerous special events staged.
Total	**73,517**	**174,873**	**5,666**	

Table 2-1 shows that, with the exception of 1996, the retail lighting programs operated by Vermont's utilities operated at a fairly constant pace over the eight years prior to the inception of EVT. On average, about 10,500 customers participated each year, with program purchases of 2.2 CF bulbs apiece.

2.1.2 Transition to EVT Management

Transition of the residential lighting programs to EVT management was accomplished with little disruption to the basic organizational structure of the StarLights effort. EVT recruited the individual who managed residential programs at Green Mountain Power to assume that role. The association with the StarLights program and regional advertising was maintained, as were the contracts with EFI and APT. In its initial program planning, EVT identified the following objectives:

- Open the program to participation by non-residential customers;
- Take advantage of the growing public recognition of the ENERGY STAR label;
- Take advantage of the growing availability of ENERGY STAR-qualified torchieres to promote the product;
- Increase product availability at retailers and recruit new retailers into the program.

Early changes to the program included the following.

- ***Product eligibility.*** The StarLights program had developed and maintained its own qualifying product list. This list was dropped, and customers were directed to purchase lighting products that carried the ENERGY STAR label.
- ***Rebate levels.*** At the point of program management transition, bulb coupons were valued at $9 and fixture coupons at $20. In early 2000, the bulb coupon value fell to $8, then to $7 in June, when EVT had its first opportunity to revise and reprint the coupons. Subsequently, the value of the bulb coupon has been reduced to $4.
- ***Customer eligibility.*** With the June 2000 coupon reprinting, the program was opened up to all customers, not just residential customers.

2.1.3 EVT Program Operations

Customer services and incentives. The key program services and incentives for customers include point of purchase rebates for compact fluorescent bulbs and fixtures and catalog sales at discounted prices of compact fluorescent bulbs and fixtures Customers are permitted to redeem rebates for a maximum of six compact fluorescent bulbs and four compact fluorescent fixtures per account per year. Non-torchiere light fixture rebates were reduced from $20 to $15 during 2001. In addition to instant rebates, the program has sponsored a number of special events to promote and sell efficient lighting products, including a number of torchiere turn-ins.

EVT has used catalog promotions in a targeted fashion. In 2000, catalog sales accounted for 3 percent of all units sold through the program; for 6 percent in 2001. In 2000, EVT promoted the catalog through a bill insert placed in the fall. Orders from this promotion began to be seen in December 2000 and carried into the first quarter of 2001. In 2001, EVT sent a direct mail catalog to previous program participants, which accounts for the somewhat higher volume in that year. In 2002, EVT has targeted catalog mailings to customers who have not yet participated in the program and who live in remote areas. This limited targeting has led to a reduction in catalog sales to 2 percent of total units through the first half of 2002.

Program Marketing. EVT participates in the national ENERGY STAR brand recognition effort and the regional NEEP cooperative advertising campaign. EVT has made very limited and targeted use of media advertising in support of the lighting component. It has run only one television advertisement, timed to air on the same day as a news story featuring a Vermont congressman purchasing at an Aubuchon hardware store. EVT also purchased a short run of radio ads on the Red Sox network. Newspaper advertising has been confined to co-op advertising with participating retailers, concentrated in the summer and fall.

EVT's primary program marketing efforts have involved staging special events. EVT staged a number of special promotions outside the framework of the StarLights advertising and public relations campaign. These included booths at home-shows and in-store promotions. There were 13 such events in 2000 and 23 in 2001. Table 2-2 provides a year-by-year summary of program activities, customer participation, and numbers of units rebated.

Retailer Support. The program offers a number of services to retailers participating in the program, including installation of point of purchase displays, assistance in ordering and stocking qualifying products, and sales staff training. These services are provided by APT. EFI provides coupon processing services. APT visits all participating stores an average of 12 times per year. If coupon volume remains low for a period of time, the APT field staff attempt to assess potential causes and provide advice to the store managers for increasing sales of CF products through the program.

Table 2-2
Summary of EPP Lighting Component Activity

	Participation		Units Rebated		
YEAR	Retailers	Customers	Bulbs	Fixtures	Advertising and PR Notes
2000	90	13,608	56,511	22,887	13 special events, including Torchiere Turn-in: 3,000 halogen torchieres exchanged; 5,300 bulbs and 400 fixtures sold.
2001	108	24,342	86,353	22,294	23 Special Events: Torchiere turn-ins, home show booths, in-store promotions.
2002	125	19,802	95,517	15,522	31 Special Events thru October: includes 16 in-store promotions plus a variety of home shows
Total	**varies**	**45,013**	**237,722**	**60,649**	

2.2 PATTERNS OF RETAILER PARTICIPATION

2.2.1 Program Enrollment and Support

APT recruited retailers to participate in the program and enrolled them using the following procedure.

- ***Outreach.*** APT field representatives arranged personal visits with store managers to brief them on the benefits and requirements of program participation.
- ***Enrollment.*** If the store managers agree to participate in the program, they sign a Memorandum of Understanding that summarizes their obligations as well as the services that APT will provide. The retailers' obligations include: undergo staff training, promote consumer education, follow proper coupon redemption procedures, and adhere to the guidelines for approved use of the Energy Star logo and POP materials. APT for its part formally agrees to: provide staff training on the Energy Star program, the EVT program, and sales strategies, deliver and place POP materials, assist with rebate processing, coordinate in-store promotional activities and co-op advertising opportunities, and provide qualified product lists.
- ***Initial product inventory.*** Upon enrollment, APT staff conducts an inventory of compact fluorescent products on the retailers' shelves and display floor. Initially, the inventory included model numbers and quantities for efficient lighting products. In 2001 APT began to collect pricing information.
- ***Support Services.*** Once the retailer was enrolled in the program, APT representatives visit the location once every month. During these visits, the field representative installed point-of-purchase displays, replenished stocks of coupons and product literature, and provided advice on increasing CF product sales. Upon request of the retailer, the field representatives also provided guidance regarding the program eligibility of various

specific products. Lastly, APT representatives provide a 'retailer manual' that contains much of the necessary program information.

- ***Ongoing Product Inventories.*** APT staff conduct shelf inventories of participating retailers every 6 months.

2.2.2 Patterns of Coupon Redemptions by Store Type

A core group of roughly 70 participating stores has remained fairly stable since EVT assumed program management. Among the remaining stores there is considerable movement in and out of the program. The closure of Grand Union in Vermont led to the loss of a number of participating locations, and activity levels among smaller stores tends to fluctuate considerably. In the third quarter of 2002, 140 stores were listed with EVT as program participants; 124 were located in Vermont.

XENERGY grouped the stores listed in APT's database into 6 types. The Hardware store category includes participating hardware retailers with many locations in Vermont, such as the Aubuchon and True Value Chains, as well as those with one or few locations in Vermont, such as Demar's Hardware. The Home Center and Building Supply Store category includes home centers such as Home Depot, Gilmore Home Center, and Wheeler Building Materials. Lighting and electrical supply stores are those that sell primarily electrical and/or lighting products, such as Walsh Electric Supply Company or The Lighting House. The non-store front category includes online retailers, special promotions directly through the manufacturer, and turn-in or exchange programs. The department stores category includes stores such as K-Mart and Wal-Mart. The "other" category contains all compact fluorescent lighting vendors that do not fall into another category, including grocery stores and miscellaneous others.

Volume of Coupons Redeemed by Store Type. Table 2-3 shows the number of bulbs and fixtures for which coupons were redeemed, by store type, through the end of 2002. Hardware stores represented the largest category both in terms of the percentage of total participating retail locations (55 percent) and percentage of units rebated (49 percent). Stores in the Home Center category accounted for the next highest portion of units rebated – 21 percent. A 1999 national analysis of scanner data found that home centers accounted for 60 percent of CFL sales.[1] In Southern New England and mid-Atlantic promotional programs, home centers have accounted for roughly two-thirds of all coupons redeemed.[2] On a single-store basis, home centers were important in Vermont as well. The average number of units rebated by home centers over the study period was 5,825 versus 2,497 for hardware stores. The relatively low portion of rebates from Vermont home centers reflects the rural settlement pattern of the state and the small number of home center stores to be found there. This finding suggests that the level of retailer

[1] Chris Calwell et al. (1999) *Lighting the Way to Energy Savings: How Can We Transform the Lighting Markets, Volume 2.* San Francisco: National Resources Defense Council.

[2] XENERGY Inc. (2001). *Residential Lighting Market Baseline Study*, Prepared for KeySpan Energy Corporation. XENERGY Inc. (1999). *StarLights Market Progress Report.*

support effort needed to reach and maintain high volumes of participation and rebates may have been greater in Vermont than in the other, more urban states in which the StarLights program has operated.

Table 2-3
Number and Percentage of Stores and Rebates Processed by Store Type, 2000 – 2002*

Store Type	Stores		Units Rebated		Average # Rebates per store
	Number	% of Total	Number	% of Total	
Hardware store	59	55%	147,313	49%	2,497
Home Center / Building Supply Store	11	10%	64,071	21%	5,825
Lighting / Electrical Supply Store	13	12%	43,874	15%	3,375
Non-Store Front	11	10%	31,118	10%	2,829
Department Store	6	6%	7,487	3%	1,248
Other	8	7%	4,508	2%	564
Total	**108**	**100%**	**298,371**	**100%**	2,763

***** Program began March 2000.

As Table 2-4 shows, the distribution of units rebated by outlet type has remained relatively stable over time. The major exception to that pattern is that the portion of units accounted for by special events declined from 27 percent in 2000 to 3 percent in 2002. This decline is likely a result of the initial success of some promotional events in 2000.

Table 2-4
Number of Rebates Processed by Store Type and Year, 2000 – 2002*

Store Type	2000*		2001		2002 *	
	# Rebated	% of Total	# Rebated	% of Total	# Rebated	% of Total
Hardware store	32,877	41%	43,841	40%	70,593	64%
Home Center / Building Supply Store	19,557	25%	27,162	25%	17,352	16%
Lighting / Electrical Supply Store	4,840	6%	24,292	22%	14,742	13%
Non-Store Front	21,355	27%	10,061	9%	2,983	3%
Department Store	768	1%	3,024	3%	3,695	3%
Other	1	0%	267	0%	959	1%
Total	**79,398**	**100%**	**108,647**	**100%**	**110,324**	**100%**

***** Program began March 2000.

Volume of fixtures by store type. Table 2-5 shows the distribution of bulbs and fixtures rebated by store type. Home centers sold the highest percentage of fixtures among the major outlets: 27 percent versus 17 to 25 percent for hardware stores, non-store front events, and lighting and electric supply houses. This finding is consistent with the general flow of fixtures through different retail channels. As discussed in Section 3, home centers account for approximately 30 – 40 percent of all fixture sales.

Table 2-5
Fixtures as a Percent of Total Units Rebated

	Bulbs	Fixtures	Total Units	Fixtures as % of total units
Hardware store	122,972	24,341	147,313	17%
Home Center / Building Supply Store	46,624	17,447	64,071	27%
Lighting / Electrical Supply Store	33,080	10,794	43,874	25%
Non-Store Front	23,859	7,259	31,118	23%
Department Store	7,171	316	7,487	4%
Other	4,016	492	4,508	11%
Total	**237,722**	**60,649**	**298,371**	**20%**

2.2.3 Patterns of Customer Participation

Approach. XENERGY merged the coupon redemption (rebate) databases maintained on an annual basis by EFI into a single analysis database. We then merged the individual records by town and street address to create participation records for individual customers. The following paragraphs report the results of analysis conducted on the merged customer records.

Total Participation. Through the end of 2002, 49,453 unique customers participated in the program. This is 20.6 percent of all Vermont households.[3] 14,518 of these households purchased efficient lighting products through the program on multiple occasions between March 2000 and the end of December 2002.

[3] Based upon Census 2000 determination of 240,634 households in Vermont.

Patterns of participation over time. In the period March – December 2000, 13,608 customers purchased efficient lighting products through the program. This represents an increase of over 100 percent from the level of customer participation in the year prior to EVT's assumption of program management responsibility. In 2001, 24,342 customers participated in the program, an increase of 50 percent in the annualized level of participation. In 2002, 19,802 customers participated in the program. See

Table **2-6** for details.

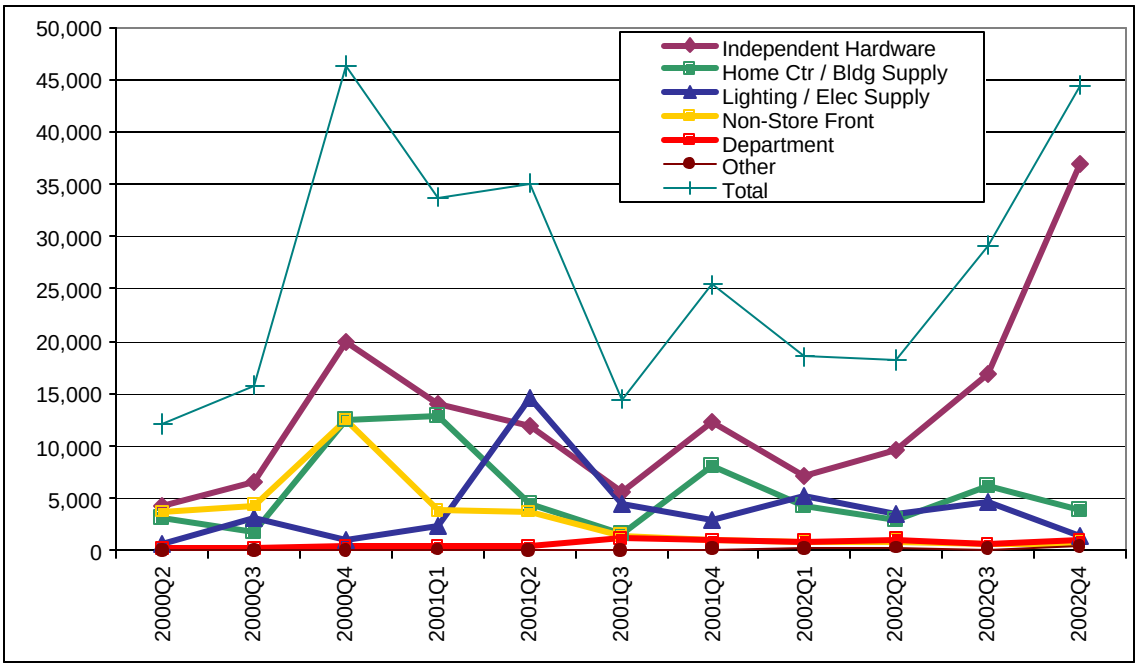
Table 2-6
Customer Participation, 2000 – 2002*

	Number of Unique Customers Per Year	Number of First Time Participants	Unique Customers as % of VT HH
2000*	13,608	13,608	5.7%
2001	24,342	21,327	10.1%
2002	19,802	14,518	8.2%
Overall	**-**	**49,453**	**16.5%**

***** Program began March 2000.

Patterns of program purchases over time. As illustrated in Figure 2-1, there were substantial quarterly fluctuations in numbers of units purchased through the program. The volume of coupons redeemed peaked in the 4th quarter of 2000 and has declined more or less steadily since then. A highly successful torchiere turn-in event in Q4 2000 may have contributed to the spike in rebates for the non-store front category. It is likely that the spikes in rebates processed during the fourth quarter of 2000, 2001, and 2002 among hardware and home centers/building supply stores are the result of stores waiting to submit their rebates until the end of each year.

Figure 2-1
Rebates Processed by Store Type and Quarter



Patterns of items purchased per customer.

Table 2-7 shows the distribution of participating customers by number of CF bulbs, fixtures, and total units of efficient lighting equipment purchased through the program. Through the end of 2002, participants bought an average of 6.0 items per purchase through the program. This figure has been increasing over time.

Table 2-7
Rebate Distribution, 2000 – 2002

# of Items	CF Bulbs	Fixtures	Bulbs and/or Fixtures
1	14.8%	34.7%	18.9%
2	12.0%	21.1%	13.0%
3	8.6%	10.0%	8.3%
4	7.7%	20.4%	9.9%
5	4.8%	3.7%	4.4%
6	30.9%	3.3%	20.3%
7	3.1%	1.5%	4.0%
8	2.5%	2.0%	3.5%
>8	15.6%	3.3%	17.6%
Total Customers	**39,247**	**20,177**	**49,453**
Purchased Bulbs or Fixtures Only	**29,276**	**10,206**	
Total Items	**237,722**	**60,649**	**298,371**
Percent of Total Items	***79.7%***	***20.3%***	***100%***
Average/Customer	**4.8**	**1.2**	**6.0**
Median/Customer	**4**	**0**	**4**

Some of the key observations to be made from

Table 2-7 are as follows.

- ***Fixture purchases.*** 20,177 customers, or 40.8 percent of all program participants bought at least one fixture through the program. Just over 10,200 participants (20.6 percent) purchased fixtures only. On average fixture purchasers bought 3.0 units through the program.
- ***Bulb Purchases.*** 39,247 customers, or 79.4 percent of all program participants bought at least one compact fluorescent bulb through the program. 29,276 participants (59.2 percent) purchased bulbs only. On average bulb purchasers bought 6.1 units through the program three units through the program.
- ***Combined purchases.*** 9,971 customers (20.2 percent) bought both bulbs and fixtures through the program.

The representation of fixture purchasers among participants is unusually high for programs run on the StarLights model. This finding indicates that the program did a good job in promoting compact fluorescent fixtures.

Purchases by contractors and commercial property owners through the program. The program sponsors were interested in assessing the extent to which contractors and commercial property owners used the program to purchase bulbs and fixtures for their projects and facilities. To develop data on this point, XENERGY searched the coupon redemption database for customer names that suggest a business as opposed to a householder. These words included: company, co., incorporated, inc., management, partners, real estate, brothers, & son, and so forth.

Table 2-8 displays the results of this analysis. Customers with business names accounted for 3 percent of participants and 3 percent of total units rebated. Our judgment is that these results underrepresent the number of businesses that participated in the program, since it is likely that many small business and rental property owners filled in their own names on the rebate forms for units destined for use in commercial or multifamily facilities.

Table 2-8
Lighting Program Rebates Issued to Business Customers

Customer Type	Rebates		Customers		Mean Rebates Per Customer
	N	% of Total	N	% of Total	
Individual	289,530	97%	38,331	97%	7.6
Business	8,841	3%	1,344	3%	6.6
Total	**298,371**	**100%**	**39,675**	**100%**	**7.5**

2.3 PARTICIPATION AND PROGRAM SALES: KEY FINDINGS AND DISCUSSION

The following paragraphs discuss the key findings generated by the analysis of coupon redemption records and comparisons with the experience of predecessor programs and similar programs elsewhere.

Rapid increase in program participation and sales compared to predecessor programs. Utilities in Vermont had been running programs to promote compact fluorescent lighting products since the early nineties. Through the end of 1998, Vermont customers had made about 73,500 purchases through these programs, for a total of 162,000 units. In 1999, the major utilities adopted the regional StarLights™ program design currently used with some modifications, by EVT. In 1999, roughly 9,000 Vermont customers participated in the program purchasing 23,300 units. In the first 10 months of operation following program launch in March 2000, over 13,600 customers participated, with purchases of 79,398 units. In 2001, 21,327 customers purchased equipment through the program, an increase of 30 percent over the previous year on an annualized basis. The number of units purchased through the program increased by a similar amount. In 2002, the number of participating customers decreased by 19 percent. The number of CF bulbs purchased increased by 11 percent, and the number of fixtures purchased decreased by 30 percent. Quarterly trends that participation and purchases are generally on the way down.

These patterns of program participation and purchases raise a number of questions:

- Given that the program did not undergo radical changes between 1999 and 2000, what factors contributed to the rapid increase in participation and purchases between those years?
- What factors are currently contributing to the decline in levels of participation and purchases? What can and should the program do in response to this trend?

According to EVT and APT staff, the principal reasons for the rapid increase in volume at the beginning of the program included:

- More consistent application of the ENERGY STAR label to the packaging of qualifying products. This change made it easier for customers to identify products on the shelf and for retailers to verify program eligibility;
- Increased recognition and understanding of the ENERGY STAR label among customers;
- Staging of a large number of publicity events;
- Decrease in prices for qualifying products.

High portion of fixture sales. Compact fluorescent fixtures yield higher unit savings than CF bulbs because they are less likely to be removed from service once installed and because their useful lives can be extended through relatively inexpensive bulb replacement. For a variety of reasons, compact fluorescent fixtures have experienced low sales and market share. Therefore, the share of fixtures among all units sold through the program is a useful indicator of its market effects. Through 2002, customers purchased 60,649 fixtures through the program. This was 20 percent of all units subsidized through the program and 6.5 percent of all lighting fixtures sold in the state during the study period.[4] By way of comparison, the Long Island StarLights program sold 37,500 fixtures in its first year. That is 10 percent of the units sold through the program and roughly 3 percent of all fixtures sold in the relevant market area.[5]

These results raise the question: what factors accounted for the high portion of fixture sales through the program. In 2000, torchiere turn-in events accounted for nearly half of fixture sales. However, this was not the case in 2001.

[4] See Section 3 for a description of the estimate of total residential fixture sales in Vermont.

[5] XENERGY Inc. 2001. *Residential Lighting Market Baseline Study*. Prepared for KeySpan Energy Services.

3 RESIDENTIAL LIGHTING BASELINE AND MARKET EFFECTS

3.1 INTRODUCTION

In this section we compile information on baseline conditions in the Vermont market for energy-efficient residential lighting equipment, and the way in which those conditions changed over the course of the first twenty-six months of program operation. Figure 3-1 shows a comprehensive range of indicators of market conditions and related program market effects. The most important of these for characterizing market effects are indicators of customer product acceptance (saturation and market share), indicators of retailer stocking and promotional support, and pricing trends. Secondary, or so-called "proximate indicators" such as levels of customer and retailer awareness of the efficient lighting products and their performance benefits provide clues regarding the likelihood that observed increases in customer acceptance or retailer support will persist in the face of program cutbacks or termination. The **bolded** items in Figure 3-1 denote indicators for which primary data were collected for the Phase 1 evaluation. Items in ***bold italics*** denote indicators for which information was derived from secondary sources or previous primary research conducted in Vermont. We propose to collect data to quantify some of the remaining indicators in subsequent phases of the evaluation.

Ideally, baseline characterization for this evaluation would encompass quantitative observations on all of the indicators in listed Figure 3-1. Unfortunately, contemporaneous observations were available only for those items shown. In some cases, market observers were able to provide some of the baseline information sought retrospectively. However, there are no data to provide direct corroboration for these recollections. Similarly, the ideal market effects assessment would contain observations on all of the indicators listed, preferably from sources that support direct comparisons to the baseline. However resource limitations precluded this kind of comprehensive approach. DPS and other stakeholders – with input from XENERGY – made decisions as to allocation of resources for primary data collection with eye to greatest value for program evaluation and improvement at this juncture. Thus, for example, it was decided to invest in the collection of sales data from a relatively small number of stores in VT and ME to assess program impact on customer acceptance and to complement this information with a large-sample on-site survey to assess the saturation of efficient lighting products (and appliances). Resources were not sufficient to conduct telephone surveys with a broad sample of customers, an approach generally used to assess program effects on customer awareness, knowledge, and purchase of the targeted products.

Wherever possible, we attempted to obtain information on a given set of research questions from multiple sources. For example, we used data from shelf inventories conducted by APT staff to corroborate information from interviews with retail managers regarding changes in stocking, pricing, and promotion patterns. Where the results of several analyses of a similar set of

conditions or events are consistent, we felt confident in making conclusions based on the findings. Inconsistency among different observations of the same events generally prompted us to return to the data to seek potential errors or other explanations for discrepancies.

Figure 3-1
Indicators of Baseline Condition and Market Effects: Efficient Residential Lighting

CATEGORY OF INDICATOR/Indicator	
PRIMARY INDICATORS: BASELINE	**PRIMARY INDICATORS: MARKET EFFECTS**
CUSTOMER ACCEPTANCE • ***Percent of housing units with compact fluorescent bulbs or fixtures installed*** • ***Saturation of bulbs and fixtures (see Section 3.2 for product-specific definitions of saturation.*** • Market share of CF fixtures	• D **in percent of housing units with compact fluorescent bulbs or fixtures installed** • D **in saturation of bulbs and fixtures.** • D **in market share of efficient fixtures** • **Number of bulbs and fixtures sold through the program.** • **Number of CF bulbs and fixtures sold by participating retailers without program incentives.**
RETAILER STOCKING AND PROMOTIONAL SUPPORT • ***Percent of relevant retailers that stock program-eligible equipment*** • Number and variety of CF bulbs and fixtures stocked*. • Percent of retailers that undertake various types of promotion for targeted equipment: advertisement, point-of-purchase, flyers.* • Pricing of eligible products v. other CF products and conventional equipment.	• D **over program term in percent of relevant retailers that stock program eligible equipment.** • D **over program term in number and variety of eligible equipment stocked.** • D **over program term in the percent of retailers who undertake various promotions.** • **Decrease over time in price of eligible products v. other CF and conventional products.**
SECONDARY INDICATORS: BASELINE	**SECONDARY INDICATORS: MARKET EFFECTS**
CUSTOMER PRODUCT AWARENESS AND KNOWLEDGE • ***Percent of customers aware of the product.*** • ***Percent of customers with accurate knowledge of product performance benefits.*** • ***Percent of customers aware of the ENERGY STAR label.*** • ***Percent of customers with accurate understanding of the ENERGY STAR label.*** • Percent of customers with favorable/unfavorable perceptions of product utility and performance.	• Δ in percent of customers aware of the product. • Δ in percent of customers with accurate knowledge of product performance benefits. • Δ in percent of customers aware of the ENERGY STAR label. • Δ in percent of customers with accurate understanding of the ENERGY STAR label. • Δ in percent of customers with favorable/unfavorable perception of product utility and performance.
RETAILER PERCEPTIONS: BUSINESS BENEFITS OF EFFICIENT PRODUCT STOCKING AND PROMOTION • Percent of retailers who believe stocking and promotion of efficient is important to overall business success.	• D **in percent of retailers who believe stocking and promotion of efficient products is important to overall business success.**

3.2 THE CUSTOMER MARKET

3.2.1 Market Size and Baseline Market Share

Compact Fluorescent Bulbs

Market Size. The two measures of market share typically used in analysis of consumer goods are:

- ***market share or penetration:*** the percentage of annual unit sales of the product category accounted for by the models, brand, or technologies of interest; and,
- ***saturation:*** the average number of targeted products present in homes or, alternatively, the percentage of homes with at least one unit of the product present.

Data can be developed on unit sales of incandescent A-type light bulbs and compact fluorescent bulbs using check-out scanner data collected by a number of large marketing research organizations. These data can be used to estimate the share of the relevant product category represented by CF bulbs. Such an analysis has been conducted in California. However, the resources required for such an analysis are far beyond those that were available to this project.[1] Moreover, A bulbs and CF bulbs are not perfectly substitutable for a number of reasons. Many fixtures designed for A bulbs will not accommodate CF bulbs. It is not economical to the customer to install CF bulbs in low-use fixtures. The much longer life of CF bulbs affects replacement cycles. Thus, it is difficult to estimate the maximum share achievable by CF bulbs, but it is certainly not 100 percent.

Saturation as usually defined also has shortcomings as an indicator of customer acceptance of CF bulbs, again because not all fixtures in a home can accommodate CF bulbs. For this report, we define saturation as the number of CF bulbs installed in Vermont homes divided by the number of sockets that can accommodate them. Thus, the size of the total market for screw-base compact bulbs, from the point of view of stock or saturation, is a function of the number of housing units in Vermont, the number of screw-in fixtures per home, and the percentage of those fixtures that can accept CFLs. Our estimates of these terms are as follows.

- ***Number of Housing Units.*** According to the 2000 Census, there are 294,382 housing units in Vermont. 240,364 are occupied year round. Since the economic rationale for installing CF bulbs in seasonal homes is fairly weak, we use the number of year round units for estimating market size.
- ***Number of screw-in sockets that can accept CF bulbs.*** As part of the on-site customer survey, the data collectors inventoried the number of lighting fixtures and light bulbs present in the sample customers' homes. On average, there were 30.6

[1] Regional Economic Research, Inc. (2001). *California Lamp Report, Volume 1.* Southern California Edison, October 2001

fixtures and 39.4 bulbs in each of the sample homes. We assumed that recessed cans, fluorescent tubes, chandeliers, vanity strips, track lighting, pendulums, torchieres will generally not accommodate a compact fluorescent bulb. Previous studies have found that these kinds of fixtures account for 31 percent of all residential sockets.[2]

Combining the results of these analyses, we estimate that there are roughly 5 million fixtures that can accommodate compact fluorescent bulbs in Vermont homes.

Baseline saturation of compact fluorescent bulbs. A 1998 baseline study of the New England residential lighting market[3] found that 30 percent of customers had at least one CFL bulb installed, with average holdings of 2.4 each or 0.8 bulbs per household averaged over the entire population. This study was based on a survey of 1,170 households from Massachusetts, Connecticut, Rhode Island, New Hampshire, and Vermont. Survey results provided by Central Vermont Public Service Corporation and Green Mountain Power Corporation suggest a lower level of holdings in Vermont, in the range of 0.2 CFLs per household (or 48,000 bulbs statewide) prior to the program. This estimate seems to be implausibly low based on the level of compact fluorescent bulb promotion by utilities throughout the 1990s.

The on-site survey of 71 existing homes conducted for this study found that sample homes had an average of 1.8 CF bulbs installed, **WITH A 90 PERCENT CONFIDENCE INTERVAL OF +/ Y.Y BULBS.** Sample respondents differed from the general population in a number of key dimensions. They were all homeowners, had higher educational attainment and lower income than the typical Vermont household, and occupied larger, older homes. These conditions may have stimulated greater-than-average interest in energy efficiency. Moreover, the on-site survey required data collectors to be in the respondent's home for up to two hours. This may also have led to self-selection of consumers who were interested in energy efficiency into the on-site sample.

The 1998 Northeast Residential Lighting Baseline Study found that renters had only one-fourth as many CFLs installed in their home as homeowners. Applying this finding to the ratio of owners to renters in Vermont, we estimated that Vermont households had, on average 1.4 screw-in CFLs installed in 2002. Multiplying by the number of households in Vermont yielded an estimate of 337,000 total screw-in CFLs installed at the time of the on-site survey in the third quarter of 2002.

Energy-Efficient Lighting Fixtures

Market Size and Segmentation. The 1998 baseline study of the New England residential lighting market estimated the number of fixtures purchased by residential customers by type and purchase decision driver (replacement, addition, etc.). On average, customers in the

[2] XENERGY Inc. 2001. *Long Island Residential Lighting Market Assessment.* KeySpan Energy Corporation.

[3] Opinion Dynamics Corp., 1998.

sample reported purchasing 1.4 fixtures per year. Scaling the results of the 1998 baseline study to the number of households in Vermont, we estimate that Vermont households annually purchase 340,000 fixtures.[4] Table 3-1 shows the distribution of fixtures purchased by type (permanent v. portable) and application (replacement v. new construction or renovation).

Table 3-1
Distribution of Fixtures Purchased by Type and Application: New England

	Fixture Type		
	Permanent	**Portable**	**Total**
New Construction	18%	11%	15%
Renovation/Remodeling	24%	12%	19%
Replacement/Add Fixtures to Existing Rooms	58%	78%	66%
Total	100%	100%	100%

- ***Permanent v. portable fixtures.*** Sixty-one percent of fixtures purchased were permanent indoor or outdoor fixtures; the remaining 39 percent were portable fixtures.
- ***Replacement v. New Construction/Renovation.*** Thirty-four percent of all fixtures and 42 percent of all permanent fixtures are purchased for use in new construction or renovation projects. This finding highlights the importance of builders and renovation contractors as fixture purchase decision makers.
- ***Builders and remodelers as fixture purchase decision makers.*** Builders interviewed for the Residential New Construction program evaluation reported that they select the permanent lighting fixtures installed in 40 percent of the homes they build without input from the home buyer. In an additional 17 percent of cases, customers select fixtures from catalogs provided by the builder. In the remaining 43 percent of cases, customers furnish the fixtures to be installed. Remodelers interviewed for the New Construction Program Evaluation reported that they installed hard-wired lighting fixtures in the course of 87 percent of their projects. They reported selecting the fixtures installed in 59 percent of these projects. Thus, builders and remodelers make the purchase decision for approximately 23 percent of the permanent fixtures sold into the residential market, or 14 percent of the total. This estimate is consistent with findings from the survey of lighting retailers conducted for this evaluation. On average, the sample retailers reported that 20 percent of their lighting sales were to builders and contractors.

[4] The split between owner and renter households in Vermont is roughly equal to that in the sample for the baseline survey.

- ***Saturation of compact fluorescent fixtures in Vermont new construction.*** As part of the Residential New Construction program, West Hill Energy and Computing undertook an on-site inventory of 159 homes built in 2000 and 2001. The inventory included counts of permanent lighting fixtures by type. The survey found that 47 percent of the sample homes had compact fluorescent fixtures installed. CF fixtures were found in 80 percent of the houses that had been certified as part of the Vermont Star homes program and 31 percent of the homes that had not gone though the program. On average there were 2.8 compact fluorescent fixtures installed in the sample homes: 5.7 in the homes that had gone through the program and 1.4 in those that had not. Multiplying by the number of new single-family homes built per year (around 1,800), CF fixture purchase for use in new residential construction amounts to roughly 5,000 units per year. By way of comparison, roughly 22,000 fixtures were rebated through the EPP program each year in 2000 and 2001.

Baseline purchase and saturation of CF fixtures. All available evidence suggests that baseline saturation and purchases of CF fixtures were very low. In 1999, the program rebated only 1000 units statewide. The Aubuchon store managers who provided CF bulb sales data reported that they had practically no CF fixture sales prior to the start of the EVT program. The 12 retail store or lighting section managers interviewed in depth for the evaluation reported that fixture sales were very closely linked to the availability of rebates. Given this finding, and the relative newness of CF fixtures, we find it likely that there were few relatively non-rebated fixture sales during its first three years of operation.

3.2.2 Assessment of Program Effects on CF Bulb and Fixture Sales

Overview

XENERGY undertook the following data collection and analysis tasks to assess the effect of the program on CF bulb and fixture sales.

- ***Analysis of CF Bulb Sales and Rebate Data from sample stores.*** Working with APT, XENERGY obtained and analyzed data on unit sales of CF bulbs from five Aubuchon and five True Value hardware stores spanning last three quarters of 2000 and all four quarters of 2001. To assess the extent of sales non-rebated CF bulb sales, we compared the numbers of bulbs for which coupons were submitted by each of the stores to the total number of units sold. We also compared the volume of sales in the Vermont stores to sales of CF bulbs in seven stores in Maine: five Aubuchon locations and two True Value locations. There have been no promotional programs for efficient residential lighting products in Maine within recent years. Due to the difficulty of collecting this kind of data, the number of observations developed through this effort is relatively low, too low to support point estimates of total CF sales or program spillover effects. However, the comparison to the Vermont experience provides an indication of relative magnitude of the net effect of the program on CF bulb sales.

- ***Review of results of similar studies.*** Through the early 1990s, a number of New England utility companies sponsored evaluations of their residential lighting programs that included estimates of non-participant spillover. In all cases, these calculations included estimates of non-rebated CFL sales developed using results of surveys of populations the eligible customers. In 2002, the Northwest Energy Efficiency Alliance sponsored a market progress report on residential CFL bulbs which assessed the first year results of a region-wide rebate program. The centerpiece of this report is analysis of CFL sales data from over 1000 participating, combined with various store population statistics, to estimate the level of non-rebated sales.
- ***Analysis of current saturation estimates.*** As part of this evaluation effort, XENERGY conducted a survey of 71 homes during the summer of 2002. The survey gathered detailed information on the number, room location, and type of fixtures and light bulbs. The results of this analysis were used to estimate the average number of CF bulbs and fixtures per house. Using information on the number of CF bulbs sold through utility and EVT programs over the past five years and information from numerous residential lighting program impact and persistence studies, we develop an estimate of the range of saturation levels we would expect to see if there were no non-rebated CF bulb sales. We then compare this estimate to the observed saturation to assess the plausibility of spillover estimates generated through the sales analysis.
- ***Comparison with point-of-sale data.*** The California Energy Commission has sponsored an ongoing study of the market share of compact fluorescent bulbs based on analysis of several national datasets containing check-out scanner information on incandescent, fluorescent, halogen, and compact fluorescent bulbs. These data are drawn from large national samples of the following kinds of stores: grocery, drug, hardware/home center, and mass merchandisers. These studies also contain national estimates of sales of compact fluorescent bulbs for the period 1999 through 2001. The results of these studies provide a point of reference for assessing the plausibility of the results of smaller scale data collection carried out for this evaluation. They also furnish a point of reference for assessing net program effects.
- ***Analysis of interviews with retailers.*** As part of our interviews with retailers, we elicited their perceptions of trends in sales of CF bulbs and fixtures since the inception of the program.

Key Findings

The analyses described above arrived at estimates of sales or saturation that were consistent with one another. The results indicated that there had been a much larger volume of unrebated bulb sales in 2000 and 2001 than would have been anticipated on the basis of previous studies.[5]

[5] It should be noted that these studies were based for the most part on unverified reports from customer telephone surveys.

- ***The volume of CFL products sold in the sample of Vermont stores increased substantially between program inception in the first quarter of 2000 and the end of 2001.*** For the five Aubuchon stores in the sample, total sales of CF bulbs were 4,245 in the last three quarters of 2000 and 6,295 in 2001. According to store managers, unit sales in 1999 totaled roughly 1000. Eighty-nine percent of the CF bulbs sold by the Aubuchon stores in 2000 qualified for the ENERGY STAR label.

- ***The volume of products sold in sample Vermont stores was vastly greater than in similar retail locations in Maine.*** In the five Maine Aubuchon stores, the volume of CFL products sold was less than one percent of the sales from the five Vermont stores in 2000 and approximately two percent of Vermont sales in 2001.

- ***A significant portion of total CF purchases in Vermont were made without the use of coupons.*** The Aubuchon stores sold a total of 9,487 ENERGY STAR qualified CF bulbs over the period for which data were available: 2nd quarter of 2000 though the 4th quarter of 2001. Of these, 5,539 or 58 percent were purchased without accompanying rebate coupons. Among the True Value stores, 33 percent of CF bulb sales were unrebated. The weighted average "outside program" sales for the 10 stores was 56 percent. The lighting manager for Vermont's major home center store reported that that the location's portion of unrebated CF bulb sales were significantly less than was found among hardware stores. Home Centers accounted for 22 percent of CF bulb coupon redemptions.

  XENERGY developed a stock adjustment model to assess the consistency of various estimates of unrebated sales with findings from the on-site survey concerning the then-current saturation of CF bulbs. The results of this exercise demonstrated that the estimated number of CF bulbs installed in Vermont homes in 2002 were consistent with unrebated sales ranging from 30 to 50 percent of total sales.

- ***Program effects on CF bulb sales.*** The results mentioned above suggest that the program has had a strong, positive effect on sales of compact fluorescent bulbs in Vermont. Taken together, the results of the retail sales and saturation analyses suggest that unrebated sales of CF bulbs in Vermont have been significant, accounting for 30 to 50 percent of total program sales. Moreover, comparisons between the hardware stores in Vermont and Maine in the volume of CF bulb sales; comparison of sales before and after program inception in Vermont; and comparison of point of sale data between Vermont, California, and the rest of the country all suggest that the program has had a strong net impact. However, in the absence of self-reported data on the influence of the program on customer purchase or more extensive cross-sectional analyses, we cannot develop a quantitative estimate of net program effects on CF bulbs sales.

- ***Program effects on fixture sales.*** Data collected for this evaluation do not support an estimate of net program effects on compact fluorescent fixture sales. The main problem is that we do not have a reliable estimate of unrebated CF fixture sales. Previous evaluations based on customer surveys have found low levels of free-ridership and participant spillover for fixture incentive programs. We recommend using a net-to-gross ratio of 1.0 for fixture sales, pending the availability of better sales data or Vermont-specific survey data on customer response to the fixture incentive offer.

Vermont Sales Analysis Methods

The following paragraphs summarize key elements of the sales data collection and analysis effort.

- ***Sampling Approach.*** Given the significant effort required to obtain, prepare, and validate sales data on a large number of items (see below) as well as the high level of cooperation required from retailers, XENERGY, DPS, and other stakeholders in the evaluation agreed that development of a probability-based sampling approach to represent the population of retail establishments was not feasible. Rather, we first selected store locations in Vermont that reflected the range of market sizes served. We used the population of the town in which the store was located as a proxy measure for market size. Once corporate officials at the participating organizations informed us of the Vermont stores for which data would be available, we worked with those officials to identify locations in Maine that matched the Vermont sample as closely as possible in terms of store size (measured in square feet) and town population.
- ***Portion of total program activity represented.*** The five Aubuchon stores accounted for 2 percent of the total number of coupons redeemed over the 7 quarters of program activity for which data were collected. The five True Value stores represented 0.3 percent of total coupons redeemed.
- ***Data Collection.*** XENERGY worked with Applied Proactive Technologies (APT), the contractor for the retail support component of the EPP to obtain the sales data needed to carry out the analysis. The data collection process consisted of the following steps:
  - *Negotiations to obtain data.* APT contacted corporate officials of a number of the retail chains or franchise groups with Vermont locations that were active in the EPP. Working with XENERGY's guidance, APT requested CFL sales data by model number at the store level for locations in Vermont and Maine, going back in time as far as possible. APT was instructed to be as flexible as possible within these guidelines. XENERGY took on the responsibility for deciphering, cleaning, and processing the data working from whatever information the retailers could provide. The groups that provided an initial favorable response were Home Depot (1 location in Vermont); Aubuchon Hardware (32 locations); and True Value (14 locations). Ultimately, we were able to obtain data from Aubuchon and True Value.
  - *Collection of coupon processing data.* Once the stores in the Vermont sample were identified, XENERGY obtained coupon processing records for them from the Energy Federation, Inc.
  - *Data preparation.* The records from Aubuchon, which were provided by the corporate organization, were in considerably better shape than those from the True Value stores, which were provided by the individual locations. Steps in data

preparation included verifying ENERGY STAR qualification for model numbers, allocating sales and coupon redemption to quarterly periods[6], and matching sales and coupon records to the appropriate stores.

XENERGY initially requested data only for the program period, which began in the second quarter of 2000. However, after the data from all sources were assembled it became clear that sales data from the previous year would be useful for proper interpretation of the results of the initial sales analysis. Unfortunately, the stores that provided data for the 2000 and 2001 analyses reported that they had not kept track of CF bulb sales in 1999.

The following sections present the sales findings in detail Because the sales records were received in very different condition from the Aubuchon and True Value stores, the results for these companies are analyzed and presented individually.

Detailed Findings: Aubuchon Hardware Stores

The Aubuchon corporate office furnished sales records were received containing data on 18 CFL products from five stores in Vermont and five stores in Maine. Sales data were presented quarterly for each product from the 2nd quarter of 2000 through the 4th quarter of 2001. In all cases, the populations are relatively small (between 2,000 and 20,000 people) and store sizes are similar (between 4,000 and 6,000 square feet of retail space). The Maine towns have slightly larger populations than the Vermont towns, which could suggest higher overall levels of traffic and sales. However, it is also possible that there are more competing hardware stores present in these larger areas, thus limiting sales in any one store. In any case, sales of CF bulbs in the Vermont stores were so much higher than they were in Maine that potential, relatively small differences in overall volume between stores in the two states do not cloud the comparison. See

[6] For Aubuchon records only. True Value sales data were only made available aggregated at the annual level.

Table 3-2.

Table 3-2
Store Characteristics and Annual Sales of ENERGY STAR Qualifying CFL Products Among Comparable Aubuchon Stores in Vermont and Maine, 2000 and 2001**

Location	Population *	Store Size (Ft^2 Retail Space)	Annual Sales, ENERGY STAR Qualifying CFL Products (Bulbs & Fixtures)	
			2000 **	2001
Morrisville VT	2,098	6,025	1,677	1,905
Rumford ME	6,472	5,000	5	44
Bradford VT	2,610	4,828	447	1,028
Farmington ME	7,410	4,800	1	33
Manchester VT	4,180	4,111	217	608
North Windham ME	14,904	4,000	3	2
Middlebury VT	6,252	5,080	188	563
Waterville ME	15,605	6,000	10	64
Rutland VT	18,107	4,387	1,229	1,624
Sanford ME	20,806	4,780	2	17

* Town population, US Census 2000. ** From Q2 2000.

Sales Comparison. Table 3-3 summarizes the comparison between the Vermont and Maine stores in terms of sales of qualifying and non-qualifying CF bulbs. Over the 7 quarters covered by the data, the Vermont stores sold a total of 10, 539 bulbs compared to 169 sold by the Maine stores. The percentage of unit sales accounted for by ENERGY STAR qualified models was roughly the same in both states: 90 percent in Vermont v. 92 percent in Maine.

Table 3-3
CFL Sales in Sample Aubuchon Stores by State, ENERGY STAR Status, and Year

	2000**		2001		Total	
	Vermont	Maine	Vermont	Maine	Vermont	Maine
Total CF Bulbs Sold	4,245	25	6,294	144	10,539	169
ENERGY STAR-qualifying units sold	3,778	21	5,728	134	9,506	155
Percent of ENERGY STAR-qualifying units	89%	84%	91%	93%	90%	92%

** From Q2 2000.

Of the 18 CFL products listed in the Aubuchon sales data, 16 were manufactured by Maxlite and two by Lights of America (LOA). Thirteen of these models qualified for the ENERGY STAR label. No sales were reported for three of the five non-qualifying products for which Aubuchon corporate provided data.

Types of products. Of the qualifying ENERGY STAR products, bulbs represented the vast majority of sales: between 86% and 89% across all five stores[7]. See Table 3-4. The portion of total CF unit sales accounted for by fixtures is quite a bit lower than their portion of total rebates. This result is to be expected given the low level CF fixture purchases prior to the program.

Table 3-4
ENERGY STAR Qualifying Product Sales by Product Type
at Selected Aubuchon Stores

Product Type	2000**		2001	
	# Sold	% of Total	# Sold	% of Total
Bulb	3,342	89%	4,925	86%
Fixture	416	11%	774	14%
Torchiere	0	0%	29	1%
Total	**3,758**	**100%**	**5,728**	**100%**

** From Q2 2000.

Unrebated sales. The number of CF products sold outside the program – that is, without coupons – is one important parameter in estimating program spillover. Spillover is defined as the number of units of the targeted product sold due to the influence of the program less the number directly subsidized. The spillover rate is defined by the number of spillover units divided by the number of subsidized units.

To estimate the number of unrebated sales, we computed the number of coupons processed in each quarter of operation for the five sample stores from the complete data base of coupon redemptions maintained by EFI. We then compared the quarterly coupon redemptions to the quarterly sales records of ENERGY STAR-qualified products in the sample stores. Table 3-5 shows the results of this comparison.

In the course of doing the analysis, we identified what appeared to be significant time lags between sales and coupon redemptions, particularly in 2000. EVT and store managers confirmed these lags and attributed them to a number of factors. First, Aubuchon corporate personnel report that their rebate processing procedures were not in place until fairly late in 2000. Second, store managers reported accumulating large numbers of coupons and processing them in batches. In some cases they did not process their first batch until 2001. Given these problems in matching the timing of sales to coupon redemptions, it makes most sense to look at total results for the seven quarters in assessing the extent of sales outside the program.

[7] Hereafter, sales figures are presented across all three product types because fixture and torchiere sales comprise a relatively small fraction of overall sales.

Table 3-5
Coupons Redeemed and Qualifying CFL Products Sold at Selected Vermont Aubuchon Stores, 2000 and 2001**

Year	Coupons Redeemed*	Total Qualified Units Sold	Percent of Units Sold Outside Program
2000*	626	3,759	83%
2001	3,322	5,728	42%
Total	**3,948**	**9,487**	**58%**

***** Includes coupons redeemed by individual stores and corporate office. Coupons processed through the Aubuchon corporate office were reported as a total figure and allocated among stores based upon each store's percentage of total CFL products sold.

After reviewing findings from the True Value stores, we assess the plausibility of the estimates of unrebated sales using data from a number of different sources.

True Value Hardware Stores

Sales records proved more difficult to acquire than from True Value stores than from the Aubuchon chain. Because True Value operates as a buyers cooperative rather than a corporation, a great deal of contact with individual store managers was necessary to obtain good sales records, and some managers were more willing to assist than others (primarily as a result of other demands on their time). Information was received in hand-written form for inconsistent time periods, often just annual figures. Sales data were compiled from several different sources and, as a result, we do not have as much confidence in the True Value records as we do in the Aubuchon data. The following analysis of the True Value data is therefore more limited in scope.

There were further complications. True Value sales data were reported by store item number, a chain-specific code that does not correspond with the manufacturer codes listed in the ENERGY STAR CFL products database. Therefore, we assumed that all products for which EVT coupons were redeemed qualified for the ENERGY STAR label at the time of purchase. In addition, EVT coupon data was reported by a model number assigned by the Tru-Serv corporation ("Tru-Serv number"). A list was obtained from the Tru-Serv corporate office to cross-reference these numbers with the stores' item numbers. In this way we were able to compare store sales data with EVT coupon data.

Store Matching. Initially, we expected to receive data from five True Value stores in Vermont and five comparable stores in Maine, all selected to be representative of stores in each state. As mentioned above, data collection issues resulted in our receiving annual sales and coupon redemption data for four stores in Vermont: Lyndonville, Orleans, Waitsfield, and Waterbury. For the Burlington store, we have coupon data but adequate sales data were not available. Good sales records were available for 2001 from only two stores in Maine: Presque Isle and Bar Harbor. Sales data from the other three Maine stores were not useable for a variety of reasons.

Thus, we were only able to match two sets of stores for just one year (2001), as shown in Table 3-6.[8]

Sales Comparison. 2001 sales of CFL products were roughly equal in the Waitsfield VT and Bar Harbor ME stores. However, Bar Harbor is 3 times more populous than Waitsfield. The Waterbury VT sold over 4 times as many CFL products as the Presque Isle ME store, which is located in a town roughly twice the size of Waterbury.

Table 3-6
Store Characteristics and Annual Sales of ENERGY STAR Qualifying CFL Products Among Comparable True Value Stores in Vermont and Maine, 2000 and 2001**

Location	Population	Annual Sales of ENERGY STAR Qualifying CFL Products	
		2000**	2001
Waitsfield VT	1,659	29	139
Bar Harbor ME	4,820	†	169
Waterbury VT	4,915	54	529
Presque Isle ME	9,511	†	117

** From Q2 2000. † Data unavailable

Unrebated Sales. Table 3-6 displays sales and rebate figures for the True Value stores in Lyndonville, Orleans, Waitsfield, and Waterbury, Vermont. These figures include five products in the Lyndonville and Orleans stores, and seven products in the Waterbury store. These products were the only ones for which both sales and coupon data were available.[9]
In 2000, only the Waterbury True Value store participated in the EVT program. In 2001, the Waterbury store redeemed coupons for nearly all of it's qualifying sales of over 500 units. The reported redemption of 12 more coupons than units sold is likely due to inaccurate sales records. The other three stores - Lyndonville, Waitsfield, and Orleans - sold no qualifying products in 2000 but participated in to a greater extent in 2001. Still, few sales were redeemed for coupons. Because the True Value stores are not part of parent corporation (like Aubuchon), it is likely that program involvement depends on the individual storeowner. Overall, 33 percent of the bulbs sold by the four True Value stores were sold without program coupons.

For all 9 stores for which sales records were available, 56 percent of unit sales were unrebated. Expressed in terms from previous lighting studies that used the number of units rebated as the base quantity, these limited data suggest unrebated sales of 100 percent or more.

[8] Retail space (square footage) was unavailable for the True Value stores

[9] Because there are so few products overall, sales and rebate data was not broken down by product type (ie, bulb, fixture, or torchiere).

Limitations on interpretation. As striking as the results of the sales analysis are, we need to acknowledge factors that limit our ability to generalize the findings to the population of Vermont customers and retailers. First, the 10 Vermont stores for which we have data represent only 2 percent of total program rebate activity. Second, the sample includes only hardware stores. Hardware stores accounted for 41 percent of program coupon redemptions. Anecdotal evidence suggests that the proportion of outside sales at home centers was considerably less than that experienced by independent retailers. Other types retailers lighting supply outlets contributed major volume to the program and may have very different patterns of outside-program sales activity. Third, the effects of transition in program marketing and administrative processes in 2000 may have distorted the record timing on rebates.

3.2.3 Sales Findings in Context

XENERGY undertook three tasks to put the sales findings in perspective. In the first, we compare the findings regarding unrebated CF bulb sales to related findings in previous studies of the market effects of rebate programs. In the second, we assess the data on unrebated sales in light of saturation estimates developed from the results of the on-site survey of 71 existing VT homes conducted for this evaluation. Finally, we compare total sales estimates in Vermont to estimates of sales in California and the U. S. as a whole that were generated through analysis of comprehensive point-of-sale data.

Comparison to Results of Previous Studies

New England Utility Program Evaluations: Customer Survey Results. Between 1993 and 1996, various utilities that operated residential lighting programs commissioned evaluations that encompassed estimation of spillover using the results of customer surveys. One stage in this process was to estimate the volume of unrebated CFL purchases. The most methodologically rigorous of these efforts, in terms of sampling and analysis, was the *Residential Lighting Spillover Study*.[10] This study used the results of a region-wide survey of all residential customers to estimate the number of CF bulbs purchased by program participants and non-participants over a period of five years. Analysis of this survey yielded estimates of non-rebated sales at 19.3 percent: 17.1 percent to program nonparticipants and 2.2 percent to participants. Studies involving areas within the region covered by the *Residential Lighting Spillover Study* or shorter time frames arrived at similar estimates of sales outside the program.[11]

Northwest Energy Efficiency Alliance Market Progress Evaluation Report. In the latter half of 2000, the Northwest Energy Efficiency Alliance, in conjunction with utility companies in Washington State, Oregon, Montana, and Idaho launched a residential CFL rebate program to complement an existing promotional program. The existing programs, initiated in 1997, had relied primarily on retailer merchandising support and manufacturer write-downs to stimulate

[10] XENERGY Inc. 1995. *Residential Lighting Spillover Study*. The NEES Companies, Northeast Utilities, Eastern Edison Associates, Boston Edison Company, Commonwealth Electric.

[11] XENERGY Inc. 1999. *Northeast Residential Lighting Market Progress Report.* The NEES Companies, Northeast Utilities, Eastern Edison Associates, Boston Edison Company.

purchases of compact fluorescent bulbs and fixtures. In response to the energy crisis of 2000 and the desire of some utilities in the region to further facilitate customer acceptance of CFLs, the Alliance coordinated a coupon program in which, ultimately, 80 utilities in the region participated. Coupons to lower the retail cost of compact fluorescent bulbs were first offered in July of 2000.

The Alliance sponsored a market progress evaluation covering the results of the coupon initiative through the end of 2001.[12] The centerpiece of this evaluation is an analysis of sales records from 1,006 of the 1,242 participating retail outlets. These records supported direct estimation of total CF bulb sales, rebated sales, and non-rebated sales for participating retailers. Using the results of a survey of 184 non-participating stores in the region, the analysts estimated that thee were an additional 1,513 stores in the region that sold compact fluorescent bulbs. Some of these stores redeemed CF bulb coupons even though they had not signed a formal cooperative marketing agreement with the program. Based on the results of the nonparticipant store survey and analysis of coupon records, the analysts estimated coupon (rebated) sales and non-coupon (unrebated) sales by nonparticipating retailers in the region.

Table 3-7
Summary of Northwest Regional CF Bulb Sales

	2000	2001					Program
	Q4	Q1	Q2	Q3	Q4	Total	Total
# of CFLs Sold							
Participating Stores							
Coupon Sales	0	0	161,149	949,021	1,180,838	2,291,008	2,291,008
Non-Coupon Sales	268,717	454,678	1,176,186	1,065,263	789,193	3,485,320	3,754,037
Non-part. Stores							
Coupon Sales	0	0	25,137	122,336	201,089	348,562	348,562
Non-Coupon Sales	25,046	85,259	144,696	174,225	206,795	610,975	636,021
Total	293,763	539,937	1,507,168	2,310,845	2,377,915	6,735,865	7,029,628
% Non Coupon Sales							
In All Stores	100%	100%	88%	54%	42%	61%	62%
In Participating Stores	100%	100%	88%	53%	40%	60%	62%
In Participating Stores 2001: Q3 – Q4	53%						

Table 3-7 summarizes the results of this analysis by quarter, beginning with the 4th quarter of 2000. Given that the Vermont program attracted the participation of a very high percentage of

[12] ECONorthwest. 2002. *ENERGY STAR Residential Lighting Program: Market Progress Evaluation Report*. Portland, OR. The Northwest Energy Efficiency Alliance.

stores that sell compact fluorescent bulbs, we believe the appropriate point of comparison for assessing estimates of unrebated sales is the percentage of "non-coupon" sales for participating stores. Over the first five quarters of coupon program operation, non-coupon sales accounted for 62 percent of all CF bulb sales among participating retailers. The period in question includes an extensive start-up period (Q 4 of 2000 plus Q's 1 and 2 of 2001) during which 92 percent of total sales were not rebated. In Quarters 3 and 4 of 2001, this figure dropped to 53 percent. We believe this is the appropriate figure for comparison with Vermont results. In Vermont, consumer rebate programs had been continuous operation for eight years prior to the inception of the EVT version. Thus we would not expect there to be the kind of lag between program inception and redemption of coupons that is observed in the Northwest data.

One final note to consider in using the Northwest results to assess estimates of CF bulb sales in Vermont: the period under review in the Northwest study was characterized by great public concern over energy shortages. Twenty-nine percent of sample customers who purchased CFLs in the year prior to the study reported that they would not have made those purchases in the absence of the California energy crisis.

Comparison of Sales Estimates to Vermont Saturation Findings

Findings from on-site survey. As discussed above, analysis of the results of the on-site survey of 71 existing homes yielded an estimate of 1.8 screw-in compact fluorescent bulbs installed per respondent home, **WITH A 90 PERCENT CONFIDENCE INTERVAL OF Y.Y BULBS**. After adjusting for the absence of renters in the sample, we estimated the total number of CF bulbs installed in Vermont homes at 337,000 at the time of the on-site survey in the third quarter of 2002.

Structure and Assumptions for stock replacement model. To assess the consistency of the saturation and sales estimates, XENERGY developed a simple stock replacement model to develop estimates of the stock of CFLs installed in 2002. This model was then used to test the sensitivity of the estimate to changes in various assumptions.

- ***Basic model structure.*** The model calculates the number of CFLs installed in Vermont homes annually, beginning in 1995. We assume a "starting" stock of 75,000 bulbs installed at the end of 1994, based on records of program activity to that point. In each subsequent year, the model estimates additions to and deletions from the stock.
- ***Additions to installed stock.*** Additions to the installed stock consist of program sales and unrebated sales, adjusted for installation rates. Recent evaluations of retail rebate programs to promote CF bulbs have found that customers do not immediately install 10 – 20 percent of all bulbs purchased through the program. Most of these are retained for spares. We assume that these bulbs are installed as replacements in fixtures that have already been retrofitted by CFLs when those bulbs burn out or break. This is represented in the model by extending the median useful life of the bulbs 20 years beyond the thresholds generally found in measure retention studies. See discussion of stock attrition

below. Thus, the inputs to the portion of the model that calculates the addition to stock include:

- The number of CF bulbs sold through the program: from program records.
- The total number of CF bulbs purchased: a product of the number of units sold through the program and a factor representing an assumption concerning the level of unrebated sales.
- The installation rate, that is: the percentage of lamps purchased that are installed within the first year.

- ***Deletions from stock.*** Technically, the useful life of a product is defined as the median time to failure. The operational translation of this definition is the time required for one half of units installed in one period to be removed from service due to failure, breakage, customer dissatisfaction, or changes to the premises. Our search turned up only three persistence studies of CFLs that used acceptable methods, and none are totally comparable in terms of the programs by which the bulbs were obtained and the quality of product available at the time. The median time to removal from the three studies ranged from 3 years to 7 years. The study on the low end included only bulbs that were installed as part of a direct-install, high bill program. Because customers did not select the bulbs, pay for them, or select fixtures for installation, we would expect this program to show lower levels of measure retention than programs that required customers to buy and install bulbs. For this analysis, we assumed that bulbs installed through past and current Vermont programs would have a median time to removal of 6 years, which we then extend to 7 years to represent the effect of bringing bulbs purchased as spares into use. We represent attrition by decreasing the bulbs installed in each cohort by the quantity of one half the number installed in year 1 divided by the average useful life. In subsequent years, the number of bulbs remaining installed in each annual cohort is reduced to zero over a period of 4 years.
- ***Base case model assumptions.*** To select base case values for the various parameters in the model, we considered the results of previous studies of residential lighting programs to identify reasonable values for the installation rates and median life. We then adjusted the percentage of total purchases accounted for by unrebated sales until the model estimate of CF bulbs installed came very close to the estimate based on the on-site survey (337,000 units). Table 3-8 displays the base case assumptions.

Table 3-8
Base Case Stock Replacement Model Parameters

	Period		
Parameter/**Result**	**Pre Program**	**2000 – 2002**	**Comments/Notes**
BASE CASE VALUES			
Installation Rate	90%	85%	Studies suggest installation rate declines as # bulbs that can be rebated per account increases.
Median Useful Life	7 years	7 years	Accounts for installation of units bought as spares.
Unrebated sales	20%	43%	2000 – 2002 figure selected to bring 2002 model result close to saturation estimate from on-sites.
Estimated CF Bulbs Installed		***332,759***	

Consistency of sales estimates and stock replacement model results. Using the base case assumptions described above, the stock replacement model yielded an estimate of 332,759 bulbs installed in mid-2002, versus the estimate based on the on-site survey of 337,000. We conducted a sensitivity analysis on the results by varying the values of the following key parameters: initial number of bulbs installed (at 1994), useful life (in years), installation rate, and percentage of total sales accounted for by unrebated units. Table 3-9 shows the effect of varying the assumed values for each parameter while holding the others constant at the base case level. The percentages in the table refer to the number of bulbs installed at 2002 divided by the 332,759 yielded by the base case values. We found that the model was relatively sensitive to installation rate and unrebated sales as a percent of total sales. The model was relatively insensitive to changes in the number of lamps assumed to be installed initially and the rate of deletions from stock (median useful life).

Table 3-9
Effects of Varying Base Case Stock Replacement
Parameter Values on Base Case Estimate of CF Bulbs Installed

	Parameters and Base Case Values			
Deviation from Base Case Value	**Units Installed in 1994: 75,000**	**Median Useful Life: 7 years**	**Installation Rate 90%/85% after 1999**	**Unrebated Sales: 43% of Total**
-20%	98%	94%	90%	91%
-10%	99%	97%	95%	95%
+10%	101%	102%	104%	106%
+20%	102%	104%	n/a	108%

These results suggest that the findings of the on-site survey in regard to current CF saturation and findings from the sales analysis and secondary sources in regard to the percentage of unrebated sales are consistent, and remain so within a wide range of plausible values derived from primary and secondary research. More specifically, on the basis of the analyses described above, we are fairly certain that unrebated sales of CF bulbs by Vermont retailers accounted for 30 to 50

percent of total CF sales during the period under review: 2nd quarter of 2000 to the end of 2002. However, the results of this analysis do not provide much guidance for making a more precise estimate of sales outside the program.

Comparison to Point of Sale Data

The California Energy Commission, contracting through Southern California Edison, has sponsored a comprehensive study of the market share of energy-efficient residential appliances and lighting. The study is now in its third year. The lighting component is based on analysis of point-of-sales (POS) data from five major sales channels through which lamps are sold: food, drug, mass merchandiser, home improvement, and hardware stores. The most recent publicly available report of this project presents analysis of data for 1999 through 2001.[13] The 2001 estimates are forecast based on actual observations for the first two quarters of 2001.

[13] Regional Economic Research, Inc. op. cit.

Table 3-10 presents a comparison of CF bulb sales in the United States and California versus estimates of annual unit sales in Vermont. The following explains how figures in the various rows were assembled.

- ***Annual Units Sold.*** The California report furnished annual unit sales figure for screw-based compact fluorescent bulbs for the United States and for California. It is useful to look at the U. S. sales figures excluding California because sales of CF bulbs skyrocketed in late 2000 due to the effects of high prices and reliability problems associated with the California energy market crisis of the summer of 2000. The Vermont Program Only row shows the volumes of CF bulbs for which coupons were redeemed in each year. The Vermont Total Sales estimate incorporates an assumption that unrebated sales constitute 43 percent of total sales, the base case value used in the stock replacement analysis. XENERGY forecasted the 2001 sales figures for the US and California based on quarterly totals reported by RER going back to the third quarter of 1998.
- ***Annual Units Sold per Household.*** We use the number of households reported in the 2000 U. S. Census to normalize results for differences in population covered by the different estimates.
- ***Percent change from previous year.*** Since the Vermont sales estimates are all scaled to the number of program coupons redeemed, the percent change is the same for each Vermont estimate. Also, readers should keep in mind that the 2001 figures for California and the U. S. represent forecasts based on data from two quarters of actual observations.

Table 3-10
Summary Results of Vermont v. US Sales Analysis

	1999	2000	2001
Annual Units Sold			
United States	6,116,797	7,040,165	14,830,120 *
California	973,307	1,256,552	7,671,406*
US w/o California	5,143,490	5,783,613	7,158,715*
Vermont Program Only	22,300	56,711	86,353
Vermont Total Sales Estimate	n/a	99,493	151,496
Annual Units Sold per Household			
United States	0.058	0.067	0.141
California	0.080	0.103	0.628
US w/o California	0.055	0.062	0.077
Vermont Program Only	0.093	0.236	0.359
Vermont Total Sales Estimate	n/a	0.414	0.630
Percent Change from Previous Year			
United States		15%	111%
California		29%	511%
US w/o California		12%	24%
Vermont		154%	52%

* Forecast on the basis of results from first two quarters.

The key observations to be taken from

Table 3-10 are as follows.

- ***National Sales Trends.*** National sales of CF bulbs grew 15 percent from 1999 to 2000, then more than doubled in 2001. This increase was driven by sales in California, which rose more than five-fold from 1.26 million in 2000 to 7.67 million in 2001. Even outside California, unit sales increased 12 percent between 1999 and 2000, and 24 percent between 2000 and 2001.
- ***Baseline purchases per household.*** Customer acceptance of CF bulbs, as measured by annual purchases per household, was far higher in Vermont immediately prior to the inception of the EVT program than in the nation as a whole, and significantly higher than in California prior to consumer response to the energy crisis. In 1999, the coupon redemptions alone per Vermont household averaged 0.093, compared to *total sales* of 0.080 per household in California.
- ***Plausibility of unrebated sales estimates.*** The comparison between California and Vermont in terms of annual purchases per customer provides some basis for assessing the plausibility of the unrebated sales estimates generated from Vermont store sales data. Recall that sales in California grew rapidly in response to electricity shortages and energy prices hikes beginning in the third quarter of 2000. This was followed by an intensive public relations effort in the spring and summer of 2001 to encourage Californians to reduce energy usage. California CF bulb sales began rising sharply in the fourth quarter of 2000, doubling on a quarterly basis through mid-2001. Forecasted 2001 sales for California are 0.63 bulbs per household. This forecast incorporates the assumption that California's quarterly sales of CF bulbs continued to grow through 2001, but at a slower rate than during the first half of the year. California CF bulb sales reflect the results of an extraordinary confluence of factors: intensive media coverage of the energy crisis, well-funded public relations campaigns, intensified utility programming efforts, and efforts on the part of manufacturers, distributors, and retailers to channel a large portion of the national supply of CF bulbs into California stores. Given all these changes in factors affecting CF bulb sales, we would expect California CF bulb sales in this period to represent the high point of the possible range.

  In 2001, the EPP Residential Lighting Component provided rebates for the sale of 86,353 CF bulbs or 0.36 units per household. Applying the base case value for unrebated sales to this figure yields an estimate of total sales of 151,496 CF bulbs, or 0.63 bulbs per household. According to this analysis, CF bulb sales per household in Vermont equaled those in experienced in California after a 500 percent run-up between 2000 and 2001. Even if we assume a much lower percentage of outside-program sales, total sales per household remain close to those experienced in California.

Assessment of Net Program Effects on CF Bulb Sales

The numbers in Table 3-10 provide a starting place for developing an estimate of net program effects on compact fluorescent bulb purchases. As discussed above, we believe that the analyses above provide fairly strong evidence that unrebated sales of CF bulbs in Vermont have been

significant, accounting for 30 to 50 percent of total program sales. Moreover, we have accumulated evidence that the effect of the program on total CF bulb sales has been significant, and likely extends beyond sales accounted for by program coupons. This evidence includes the comparisons between the hardware stores in Vermont and Maine in the volume of CF bulb sales; comparison of sales before and after program inception in Vermont; and comparison of point of sale data between Vermont, California, and the rest of the country.

Unfortunately, the data available do not support any methodologically tidy approach to quantifying the net effect of the program on CF bulb sales. This would require one of two kinds of analysis. The first would be an analysis of a broad customer sample survey to assess and, where possible, quantify the influence of program activities on CF bulb purchases, both rebated and unrebated. The second would be a cross-sectional analysis of CF bulb purchases in many states or regions with differing market conditions and program availability, similar to the net effects analysis for the appliance component discussed in Section 6. Given the importance of residential lighting measures to the overall energy savings targeted by EVT's residential programs, we strongly recommend that one or both of these analyses be pursued in the second phase of the evaluation when better data are at hand.[14]

3.2.4 Effect of the Program on Fixture Sales

Data collected for this evaluation do not support an estimate of net program effects on compact fluorescent fixture sales. The main problem is that we do not have a reliable estimate of unrebated CF fixture sales. The on-site survey did yield an estimate of the current saturation of CF fixtures. For the sample, it was 0.451 fixtures per household, or roughly 108,000 for the state as a whole. This figure seems high, given that utility programs and EVT have only sold approximately 65,000 fixtures over the past 7 years. This would imply unrebated sales equal to 66 percent of sales through the program. Given the relative newness of CF fixtures and the limited number available, this volume seems unlikely to have occurred. We believe the saturation estimate reflects the survey respondents' higher-than-average level of interest in energy efficiency, and that it is significantly higher than the saturation for the population. Unfortunately, we have no sales data to compare to the saturation results. Due to the large numbers of models involved and low volumes of sales for a given model, retailers have not attempted to collect sales records for compact fluorescent fixtures, and it is unlikely that they can be induced to do so.

Previous evaluations based on customer surveys have found low levels of free-ridership and participant spillover for fixture incentive programs. We recommend using a net-to-gross ratio of 1.0 for fixture sales, pending the availability of better sales data or Vermont-specific survey data on customer response to the fixture incentive offer.

[14] We are aware that the Department of Energy, NEEP and others are now in discussions with a potential contractor for developing state-by-state point-of-sale data for residential light bulbs.

3.3 THE RETAILER MARKET

3.3.1 Market Size and Structure

Channels for CF Bulb Sales

Relative size of key channels. The results of the point-of-sale data analysis summarized in Table 3-11 show that medium-based screw-in light bulbs are sold in roughly equal portion through three sets of retailers: home center/hardware stores, mass merchants such as Wal-Mart, and food and drug stores. Compact fluorescent bulbs, by contrast, are sold almost exclusively through the home center/hardware store channel. The Southern California Edison analysis of 2000 POS data found that nearly 94 percent of screw-in CF bulbs were sold through home centers and hardware stores. The data for this study did not support further disaggregation between the home center and hardware store channels. A 1998 study conducted for the National Resources Defense Council found that over 78 percent of CF bulbs were sold through the home center/hardware store channel, with home centers accounting for 66.5 percent of the total.

Data on CF bulb unit sales by store type are not available for Vermont. However, the distribution of coupons redeemed is likely a serviceable proxy for the distribution of sales. The right hand column in Table 3-11 shows that a far higher percentage of CF bulb rebates (and probably sales) went through hardware stores and a much lower percentage went through home centers. This result reflects the low number of home centers in Vermont, which has relatively few areas with the population density needed to support a home center operation. The low percentage of coupons redeemed by food stores in Vermont reflects the withdrawal from the program of a major supermarket chain from program participation in late 2000. Lighting and electrical supply outlets also accounted for a significant portion of rebates in Vermont. Neither of the POS studies currently available collected data from those kinds of stores.

Table 3-11
Percent of Total Unit Sales by Channel
Various Products and Sources

	United States POS Data			Vermont
Source/Year Covered	**SCE 2000**	**SCE 2000**	**NRDC 1998**	**Coupons 2000 - 01**
Product	**Incand/Med Base**	**CF/Screw-in**	**CF/All**	**CF Bulbs Rebated**
Home Center	35.3 %	93.9%	66.5%	24%
Hardware			11.7%	41%
Mass Merchant	35.4%	5.6%	20.0%	2%
Lighting/Electric Supply	n/a	n/a	n/a	17%
Food	22.8%	0.5%	0.9%	<1%
Drug	6.5%	0.1%	0.2%	<1%
Other/Non Store Front	n/a	n/a	n/a	15%

Retailer Population and Program Participation.

Table 3-12 shows the total number of Vermont retailers in key categories for CF bulb sales, as listed in the Dun & Bradstreet iMarket database. It also shows the number of participating stores in each of the retailer categories. We should note that inconsistencies in retailer identifying information in the APT data base made it difficult to develop accurate counts of participating retailers. According to EVT staff, there are currently 140 retail outlets enrolled in the program, 124 of them in Vermont. The results shown in

Table 3-12 show that the program and APT did a good job of enrolling potential retailers in the program.

Table 3-12
Population of Relevant Retailers and Program Participants

	Total Listed in D&B	# Stores in Program Data Base
Hardware store	109	59
Home Center / Building Supply Store	3	11
Lighting / Electrical Supply Store	13	13
Non-Store Front		11
Department Store	23	6
Other		8
Total	**148**	**108**

Stocking and Promotion Decision-Making. As part of the evaluation, XENERGY conducted in-depth interviews with twelve retailers who had submitted lighting product coupons in 2001.[15] Nine of these retailers were relatively small hardware and lighting supply stores; all but two were part of national chains or buying cooperatives. As part of the interview, the retailers were asked to identify the persons in their organizations who participated in stocking and promotion decisions. Table 3-13 displays the responses to those questions. Local store managers were cited most often by respondents as being involved in decisions regarding inventory, stocking, and display of lighting products. Respondents also cited buyers and lighting department managers. Buyers for national chains clearly held the greatest decision making power regarding pricing and promotions. The patterns of response were similar from smaller and big box stores.

Table 3-13
Parties Involved in Decisions regarding Lighting Products

Decision Maker	Lighting Inventory	Stocking and Display	Pricing and Promotions
Participants in Decision*			
Local store manager	67%	58%	25%
Buyers for chain/coop	33%	42%	75%
Local lighting department manager	33%	25%	0%
Most important Decision maker			
Local store manager	33%	33%	25%
Buyers for chain/coop	33%	42%	75%
Local lighting department manager	33%	25%	0%
	12	12	12

*Multiple Response Question: Percentages may sum to more than 100%.

[15] See Section 3.3.3 for a detailed description of the retailer sample and interview procedures.

Sales Channels for Fixtures

General Developments in the Fixture Market. The most recent general studies of the lighting market indicate that home centers now constitute the largest channel for sales of hardwired fixtures into the residential market. National figures from a number of sources are not entirely consistent. However, they suggest that the largest chains: Home Depot, Lowe's, and Wal-Mart now account for 30 – 40 percent of all portable fixture sales. Specialty lighting stores play an important role in the market in terms of introducing new designs. However, once a certain design proves to be popular, it is copied, produced at lower costs overseas, and sold at lower prices and margins in home centers and mass merchandisers. Thus, with the consolidation of sales channels in home centers and mass merchandisers, a relatively small number of retailers exercise a great deal of power over product availability, pricing, and selection in the fixture market.

Importance of builders and remodelers. The other important feature of the supply chain for residential fixtures, for purposes of this evaluation, is the role of builders and contractors. As discussed above, on the basis of interviews with builders and remodelers conducted for the RNC evaluation, we estimate that these businesses make purchase decisions for 24 percent of the annual volume of permanent residential lighting fixtures. Lighting retailers who were interviewed in-depth for the evaluation were asked to estimate the allocation of total lighting unit sales to various classes of customers. The responses to this items suggest that smaller hardware and electric supply stores account for a greater percentage of these sales than big box building supply retailers. Managers of smaller stores reported that 25 percent of their lighting product customers are builders and remodelers, versus 7 percent of the big box managers. See Table 3-14.

Table 3-14
Distribution of Lighting Product Customers by Store Type

Custom	Non Big Box	Big Box
Residential customers/homeowners	72%	87%
Home builders/remodelers	25%	7%
Small businesses	3%	3%
Property managers for rental housing	3%	3%
Number of Respondents	9	3

3.3.2 Stocking and Pricing Practices

Table 3-15 summarizes the results of a shelf inventory carried out by APT of all stores participating in the EPP lighting component in early 2001, about one year after program inception. At that time, all stores in the program stocked CFLs. Table 3-16 displays the corresponding results for the inventory conducted in Spring 2002.

Table 3-15
Summary of Lighting Product Stocking and Pricing Practices: Spring 2001

Store Type	Number of Stores Stocking Product	Variety of CFL Models Available		Average CFL Price		Percent Carrying Fixtures	
		Average Number of Models/Store	Avg. Percent with EnergyStar Label	Standard	EnergyStar Labeled	Fixture	Torchiere
Hardware Stores	60	4.8	8%	$13.59	$12.68	63%	10%
General & Supermkt	15	1.5	5%	$16.60	$22.09	0%	0%
Lighting/Electrical Supp	11	5.5	15%	$21.63	$19.12	45%	9%
Discount & Dept Stores	6	5.3	56%	$16.15	$9.65	17%	0%
Other	5	3.8	5%	$17.31	$27.00	20%	0%
Home Centers	1	22.0	45%	$16.92	$ 9.67	100%	100%
Overall	98	4.5	14%	$15.23	$12.63	47%	8%

Table 3-16
Summary of Lighting Product Stocking and Pricing Practices: Spring 2002

Store Type	Number of Stores Stocking Product	Variety of CFL Models Available		Average CFL Price		Percent Carrying Fixtures	
		Average Number of Models/Store	Avg. Percent with EnergyStar Label	Standard	EnergyStar Labeled	Fixture	Torchiere
Hardware Stores	72	6.1	67%	$13.67	$10.18	56%	33%
General & Supermkt	2	2.5	40%	$21.79	$22.99	0%	0%
Lighting/Electrical Supp	7	7.3	41%	$12.91	$15.17	71%	29%
Discount & Dept Stores	12	3.7	91%	$10.47	$10.04	8%	17%
Other	6	4.7	86%	$16.09	$11.49	50%	0%
Home Centers	1	23.0	91%	$28.47	$11.87	100%	100%
Overall	100	5.9	68%	$13.82	$10.66	50%	29%

The following observations emerge from examination of Table 3-15 and Table 3-16.

- The average number of CFL bulb models stocked by participating stores rose by 31%, from 4.5 to 5.9 per store. Some level of increase occurred at nearly all store types.

- Home Depot carries the widest variety of CFL bulbs, over 20 models per stores. Hardware stores and electrical/lighting supply stores stock the next highest amount, between five and seven models per store. In contrast, the general merchandise and grocery stores carried only a few models.

- The percentage of CFL bulbs carrying the ENERGY STAR label rose substantially, from 14% to 68%. Major increases occurred at all types of stores.
- Average prices for standard CFL bulbs dropped nearly 10%, from $15.23 to $13.82. Similarly, average prices for ENERGY STAR qualified bulbs also fell, nearly 16%, from $12.63 to $10.66. Note that pricing differences between ENERGY STAR and standard models relates more to the type of store rather than the wattage or ENERGY STAR status.
- Stocking levels for CFL fixtures remained steady, at roughly 50%. However, stocking of CFL torchieres increased from 8% to 29%

3.3.3 Retailer Perceptions of Sales and Stocking Trends

In-depth Retailer Interviews. XENERGY conducted in-depth interviews with 12 retailers who had submitted coupons for redemption in 2001. The primary objectives of these interviews were to gauge retailer views on the importance of CF product sales to their overall business and to gather their perceptions of stocking and sales patterns. We compare retailer perceptions regarding stocking and sales practices to information gathered from other sources to assess the accuracy and depth of retailer knowledge of CF product characteristics and markets. We also probed retailer perceptions of program operations. The responses to those items are reported and assessed in the process evaluation section of this report.

Store Sample. XENERGY selected sample retail locations to reflect the make-up of stores in the EVT program database in terms of type and location. Of the 105 lighting stores listed in the participant database, about 45 percent are Hardware stores, 17 percent are "Other", 15 percent are Supermarkets, 13 percent are Electrical Supply, 6 percent are Mass Merchants, and 4 percent are Home Centers. Therefore, of the 12 lighting surveys, we completed six with hardware stores, two each with electrical supply and mass merchants; and one with home centers and 'Other' store. For the purposes of segmenting stores for this study, Big Box stores are defined as large multi-purpose chain stores. Three of the twelve interviews were conducted with managers of Big Box stores. All three were branches of a national chain. Three of the smaller stores were branches of national or regional chains with central corporate management. Another four belonged to national coop chains that provided central buying and promotional services to members.

Product Availability. All of the retail store managers indicated that their store carries some type of compact fluorescent lighting product (Table 3-17). However, three hardware stores reported carrying only CFL bulbs and one mass merchant and one electrical supply store

reported carrying only hardwired CFL fixtures. All of the stores which reported carrying CFL products also reported carrying qualifying ENERGY STAR models for those products. Managers' perceptions of stocking patterns were consistent with those found in the shelf inventories reported above.

Table 3-17
Availability of Compact Fluorescent Lighting Products

CFL Product	Non Big Box	Big Box	Overall
Compact fluorescent light bulbs for use in conventional fixtures	89%	67%	83%
Ceiling or wall-mounted lighting fixtures designed for use with pin-based compact fluorescent lamps	67%	67%	67%
Exterior lighting fixtures designed for use with pin-based compact fluorescent lamps	56%	67%	58%
Portable lighting fixtures such as table or floor lamps designed for use with pin-based compact fluorescent lamps	22%	67%	33%
Number of Respondnts	9	3	12

Stocking and Sales Trends. XENERGY asked the sample retailers to characterize trends in stocking and sales over the 12 months prior to the interviews, which corresponded to the first year of program operation under EVT management. The responses to these items, which are summarized in the following paragraphs, were extremely mixed.

- ***CFL Bulb Stocking & Sales.*** Ten of the twelve store managers indicated that their stores carry CFL bulbs; this section analyzes their responses regarding the stocking and sales of CFL bulbs. Overall, 10 percent of all light bulbs sold in the past year were compact fluorescent models, according to store managers. Only one Big Box stores answered this question and estimated 17.5 percent compared to an average of 9 percent for the eight Non Big Box stores. While these estimates may appear high, they are not inconsistent with sales and channel data presented above. In California, for example, CF bulbs accounted for 5.6 percent of all residential medium based screw-in lamp sales, and the hardware/home center channel accounted for over 90 percent of CF bulb sales. That channel accounted for roughly 35 percent of all medium based screw-in lamp sales. Thus, we can estimate the share of CF bulbs for the hardware/home center channel at around 14 percent.

  During the first twelve months of the EVT program, 40 percent of the ten stores indicated that their stocking of Energy Star CFLs had increased, 40 percent reported that stocking had remained stable, and 20 percent reported that it had declined.

- ***Fixtures.*** The retailers reported that their stocking and sales of permanent fixtures was relatively stable over the first year of EVT program management. Half of the respondents reported no change in stocking and sales over the year, and the remainder split evenly among those reporting increases and decreases. See Table 3-18. Only four

of the interviewees reported that they carried portable CF fixtures, and only one – a big box store – reported carrying more than one or two models.

Table 3-18
Retailer Reports of
CFL and Permanent Fixture Stocking and Sales Trends: 2000 - 2001

	CF Bulb Units			
Trend	**Stocked**	**Sold**	**Stocked**	**Sold**
Increased	40%	40%	22%	25%
Decreased	20%	20%	22%	25%
Stayed about the same	40%	40%	56%	50%
n =	10	10	9	8

3.3.4 Retailer Perceptions of CF Products and Markets

Product Advantages and Disadvantages. Retailer responses to questions concerning their perceptions of the consumer advantages of CF products suggest that knowledge of the energy and cost saving aspects of the product are well understood, but that other advantages such as the convenience of longer product life are less widely appreciated. Ten of the twelve retailers mentioned lower operating costs or lower life cycle costs as product benefits. Only five mentioned the longer product life or the convenience of less frequent replacements. One mentioned reduced environmental damage as a product advantage.

Four of the retailers reported that they believed that the high price of CFL products remained a major barrier to customer acceptance. Four also mentioned the limited numbers of styles available as a barrier. As two managers explained:

> *"People are not educated on their [CFL bulb] benefits, and regular bulbs are really cheap."*

> *"There are many more choices [for fixtures] now than there used to be, so things have improved. The new designs are more decorative too. However, homeowners want the styles they want and it isn't always available in an EE model."*

Other disadvantages cited by store managers include product failures, and damaged or defective merchandise.

Customer Demand. One half of store managers believed that customer demand for CFL bulbs and fixtures had increased over the first twelve months of EVT program management. Of the six respondents who noted an increase in demand, four explicitly noticed this trend for CFL bulbs. Among the same six respondents, three cited the Energy Star promotions/rebates as the driving

factor in increased sales, two cited greater customer awareness, and one cited higher electricity prices.

Customer Satisfaction. Overall, store managers report that they receive contradictory feedback from their customers about satisfaction with CFL products as explained by one manager:

> *"People are more satisfied for their energy savings. But they are less satisfied because of the wattage of the light produced, [it is] not bright enough."*

Most reported receiving little feedback from customers, either positive or negative. Two managers did reinforce one positive feature here, explaining that customers were more satisfied because the bulbs last longer and thus require less replacement. However, as one store manager said about CFL products:

> *"People [either] love 'em or hate 'em."*

3.3.5 Importance of CF Products to Overall Operations

This section analyzes the perceptions of store managers regarding the benefits, drawbacks, and business reasons for promoting CFL products.

Barriers. Ten of the twelve store managers stated that there are no major barriers or disadvantages to further stocking and promotion of Energy Star qualified CFL products. Of the two respondents who did report some type of barrier here, one noted a limited amount of showroom space and another mentioned general disinterest in bulbs and rebates at the corporate level of his organization

Benefits. Nine of the twelve respondents cited a benefit from stocking and promoting Energy Star qualified CFL products; they mentioned a wide range of benefits. Six noted the high sales for these products, saying that *"[We] can always move 'em. The stock sells itself."* and *"[We] sold an awful lot of 'em even with the lower rebate price"*. In addition, three store managers explained that CFL product availability and rebates "bring people in" to the store and tends to attract repeat customers. As one manager explained:

> *"CFL's [and] fixtures are a specialized thing, [they] bring people into the store. Customers buying them tend to be repeat customers, not new customers. One guy who buys 'em, buys 5 at a time."*

However, when store managers were asked to rate the importance of stocking and promoting Energy Star CFL products to the overall business goals of their store, three quarters indicated it was not very important. On a scale of 1 to 10, where 1 is not at all important and 10 is very important, store managers rated the importance of CFL products an average grade of 3.0 and a median grade of 2.0. See Table 3-19.

Table 3-19
Importance of Energy Star CFL Products
to Overall Business Goals

Rating	Percent
10 – Very Important	8%
5	8%
4	8%
2	75%
1 – Not at all important	0%
Number of Respondents	12

CFL products were important to two stores in order to meet customer demands and because CFL products have a high profit margin:

> *"The CFL/ES bulbs are one of our "Elite 6" products that also include paint applicators, faucets, fasteners, and lumber pine boards. These are our highest profit margin per sq. ft. products in the store."*

Of those who felt stocking and promoting CFL products was not important to their store's goals, a majority indicated that their lighting departments are small or sales volume is too low to have a strong influence on the store's agenda. As one respondent explained, *"The product line will not make or break the store."* Others explained that decisions to stock or promote CFL products are made at the corporate level and would require a policy change from upper management.

4 PROCESS EVALUATION: LIGHTING

4.1 INTRODUCTION

4.1.1 Objectives

In this section we review the design and operation of the lighting component of the EPP to assess the program's appropriateness to its objectives and the quality or program execution. Our overall objective is to identify concrete steps that EVT and the program contractors can take to improve program operations and results.

4.1.2 Key Findings

Findings from Sections 2 and 3, as well as the results of interviews with retailers reported in this Section clearly indicate that the program was appropriately designed to meet its objectives and was well-executed. From an operational standpoint, the program has two key objectives. The first is to inform consumers of the benefits of compact fluorescent lighting products. The second is to support retailers in carrying out their role of stocking ENERGY STAR qualified products and furnishing rebates in an efficient, customer-friendly manner. The program has done a good job on both of these objectives. Key items of evidence in support of this assessment are as follows.

Informing Customers

- ***Special events staged.*** With relatively limited staff and contractor resources, EVT staged 36 special publicity events in the first 19 months of the program. These events were important in launching ENERGY STAR torchieres as well as in gaining recognition for the program.
- ***Rapid increase in program volume.*** Program volume more than tripled on an annualized basis between the last year of the statewide utility program and the first year of EVT management. Preliminary data from 2002 suggest that the pace of participation has remained at a high level of 8 to 10 percent of eligible households per year. This suggests that the program has done a good job of reaching consumers and informing them of the benefits of CF products.
- ***Broad acceptance of CFLs.*** The on-site survey found that 49 percent of the sample households had CFLs installed. This is far higher than the percentage of CFL users found in any evaluation or market assessment of which we are aware. For example, the 1998 Northeast Residential Lighting Baseline Study found that 30 percent of respondents reported having CFL bulbs installed. It should be noted that the on-site sample contained only single-family home owners and that comparison between the sample respondents and the population of residential customers suggests that the respondents may have had an unusually strong interest in energy efficiency.

Retailer Recruitment and Support

- ***Commercial context*.** It is important to note that, except for lighting specialty stores, sales of lighting products account for a relatively low percentage of total sales revenues for the retailers involved in this program. Thus, for most participating retailers, the perceived importance of promoting efficient lighting products to their overall business success is low. In fact, 75 percent of those interviewed rated the importance of efficient lighting promotion at 2 out of a possible 10.
- ***Percentage of potential retailers enrolled.*** Comparison of program records and counts of establishments from Dun & Bradstreet indicates that the program has enrolled between 70 and 80 percent of the businesses that sell significant volumes of CF products: hardware stores, home centers, discount department stores, and lighting/electrical supply houses.
- ***Promotion*.** Two-thirds of the retailers interviewed reported that their stores conduct media advertising in support of CFL products, primarily in store circulars or newspapers. Less than half reported undertaking special price promotions for CFL products during the past year, although all reported having permanent in-store advertising for CFL products. It is not clear the how much of this promotional activity was linked to program enrollment and participation.
- ***Retailer product knowledge.*** One half of the retailers interviewed were able to identify product advantages beyond energy or energy cost savings. This represents a fairly high percentage of retailers with broad understanding of the product.
- ***Retailer response.*** Retailers interviewed for this evaluation gave consistently high marks to EVT and APT for all aspects of program administration and support: product placement, sales force training, and coupon processing. However, some of the retailers interviewed were unclear regarding the organizational affiliation of the program. Managers emphasized that EVT staff was accessible and sought out opportunities to work with retail stores on promotions, displays, and bring enthusiasm to the program.

4.1.3 Recommendations

The findings presented in Sections 2, 3, and 4 show that the lighting component of the EPP was well designed to meet the objectives of increasing customer purchase and retailer support of compact fluorescent lighting products, both bulbs and fixtures. They also show that the program has been diligently executed, with a high level of attention to promotion and dealer support.

The findings reviewed above suggest that there are two areas in which EVT could take steps to improve the already good performance of the program. Analysis of rebate records suggest that the number of first-time participants in the program has fallen off sharply. In 2001, "repeat" customers accounted for 12.4 percent of all program participants. In 2002 this percentage rose to 26.7. Also, the overall number of customers participating in the program fell by 19 percent between 2001 and 2002. These results may suggest that the program is reaching saturation for the most interested customer segments, and that actions need to be taken to broaden its reach.

EVT has already taken a several steps in this direction, including sending catalogs via direct mail to customers who have not yet participated and to those who live in remote areas. Other tactics to reach new customers could include:

- ***Stage promotions in retail venues that do not currently sell a lot of CFLs, such as supermarkets.*** These kinds of retail outlets may attract customers who simply do not frequent hardware stores or home centers. This approach might also encourage supermarkets to stock and sell a broader variety of CF products.

The findings also suggest that the use of CF fixtures in by remodelers remains low. Remodeling projects account for nearly one-fourth of permanent fixture purchases. To reach this market, we recommend the following.

- ***Develop a remodeler efficient lighting package.*** Such a package might be similar to the bundle of lighting measures developed for the new construction program, accompanied by a rebate and materials that can be used to inform remodeling customers of the benefits of CF fixtures.
- ***Conduct a direct-mail program to remodelers to publicize the availability of the remodeling lighting package.***

In addition to these program design initiatives, XENERGY recommends a few relatively minor changes in rebate forms and record-keeping which would facilitate program management and future evaluations. These include:

- ***Assign a unique identfier to retail locations in the program rebate database***. In some cases, single retail locations appeared with different names and other inconsistent identifying information. This made it difficult to develop definitive results in analyzing the pattern of retailer participation in the program.
- ***Add a check-off box on the coupon to distinguish products purchased for business versus home use.*** The analysis of customer names in the rebate records was a first attempt at estimating the extent to which products purchased through the program were used in business facilities and construction projects. A simple set of check-off boxes could be added to track this pattern, using the following options. I plan to install these bulbs/fixtures in 1) my own home, 2) my place of business, 3) rental property, 4) a construction project on which I am working.

4.2 RETAILER RESPONSE TO THE PROGRAM

4.2.1 Retailer Perceptions of Product Advantages

Retailers interviewed for this evaluation had a generally positive impression of the performance and value of compact fluorescent product, especially in comparison to the findings of earlier program evaluations. Table 4-1 displays the managers' perceptions of the key advantages of

compact fluorescent products for customers. Lower operating costs and energy savings were cited by three quarters of the store managers as major selling points, although one-half were able to identify additional selling points, including the convenience of less frequent replacement and reduced environmental damage.

Table 4-1
Key Advantages of CFL products

Advantages	Percent*
Lower operating costs	75%
Energy Savings	75%
Longer life/convenience of infrequent replacement	42%
Lower life-cycle costs	8%
Less environmental damage	8%
Number of Respondents	12

*Multiple Response Question: Percentages may sum to more than 100%.

One third believed that the high price of CFL products and the limited numbers of styles are the strongest influences in discouraging customers from purchasing CFL products. Very few voiced complaints about product quality, appearance, or performance as deterrents to sales.

4.3 TRAINING

This section discusses the training of sales staff regarding CFL products.

Providers. According to the store managers, employees from all of the stores interviewed have received training to support sales of CFL lighting products. Manufacturers have provided the training in just one store while Efficiency Vermont staff provided the training in al twelve store. According to the EVT program database, at least ten of the twelve stores have received training from the EVT program contractor.

Frequency. Over the past two years, the number of training opportunities has varied among stores. One manager indicated there has been only one training opportunity while three store managers indicated 20 separate training events. Non Big Box stores averaged 13 training sessions while Big Box stores averaged four.

Employees. Attendance at training sessions was reported to be high. On average, four Non Big Box employees per store attended these training sessions; 14 per store for Big Boxes. Nine of the twelve managers reported that electric or lighting department sales staff received the training.

Topics. According to the store managers, these trainings covered the technical performance, appropriate applications, and the advantages of CFL lamps and fixtures as well as program

operations. In addition, two managers mentioned the sessions explicitly covered energy savings, but only one mentioned that methods to overcome objections to price or appearance were covered.

Effectiveness. Two thirds of managers thought the sessions were very effective or somewhat effective in helping their employees sell compact fluorescent products (Table 4-2). Few respondents had suggestions for improving the training sessions although one manager did say *"It would be helpful to have more training sessions due to our high employee turnover rate."*

Table 4-2
Effectiveness of Training

Effectiveness	Percent
Very Effective	42%
Somewhat Effective	25%
Not Very Effective	8%
Not at all Effective	0%
Don't Know	25%
Number of Respondents	12

Respondents were asked how their staff became educated on CFL products and five managers identified Efficiency Vermont as a source of information. They listed pamphlets, demonstrations, and display information as useful materials that they have received from EVT.

4.4 PROMOTION & ADVERTISING

This section analyzes the response of store managers to questions regarding the advertising and promotion of EnergyStar CFL products. Most of the promotion and advertising undertaken by the sample retailers were related to the program through cooperative advertising and tie-ins to the rebate offer. These findings emphasize the importance of the program in supporting retailer promotion efforts.

Advertising. Eight of the twelve stores reported conducting some form of media advertising for ENERGY STAR qualified compact fluorescent products. With the exception of one radio ad and one home show, all of these stores advertised in some form of print media (Table 4-3). Three of the stores advertised in the newspaper and five advertised in their store circulars.

One store ran advertisements once per month and three ran their advertisements at least once per quarter, while the remaining stores did so less frequently.

Table 4-3
Advertisings Campaign for CFL products

Type of Advertising	Percent

Type of Advertising	Percent
Store Circulars	42%
Newspaper	25%
Radio	8%
Home Show	8%
Number of Respondents	12
Advertising Frequency	
At least once per month	8%
At least once per quarter	25%
Less frequently	25%
Number of Respondents	12

Over the past year, three of the five stores that reported holding price promotions for CFL products had them in effect at least once per quarter (Table 4-4). The one "all the time" response may refer to the standard EVT rebates.

Table 4-4
Frequency of CFL Product Promotion and Advertising

Frequency	Price Promotions in Effect	In-store Advertising for CFL Products
All the time	8%	83%
At least one week per month	0%	0%
At least one week per quarter	25%	8%
Less frequently	8%	8%
Number of Respondents	12	12

In-Store Advertising. All twelve of the stores interviewed have posted in-store advertising for CFL products, such as endcaps, banners, shelf talkers, signs, coupons, and stickers. As shown in Table 4-4, these in-store advertisements have been continuously posted in nearly all of the retail stores.

4.5 PROGRAM RESPONSE

In this section we discuss the response of store managers to the Efficiency Vermont program.

Program Awareness and Participation. All of the store managers interviewed were aware of Efficiency Vermont's (EVT) program to promote purchases of Energy Star compact fluorescent bulbs and fixtures (Table 4-5). In addition, over one-half reported that the EVT program

operator has approached them to participate in the program. Of the twelve stores, 25 percent initially reported enrolling in the program, mostly because it is "a good program to be in."

However, all of the respondents reported being aware of the Efficiency Vermont program and receiving training from EVT (see Section 1.9). Therefore it appears that all sampled retail stores actually do participate in the program but many respondents were confused about their participation. To confirm this hypothesis, store names were cross-checked against the EVT program database, and it was determined that all twelve stores are participating in the program. Thus, it is apparent that some retailers have a difficult time distinguishing between the roles of ENERGY STAR and Efficiency Vermont and which entity operates the rebate program. In fact, some respondents referred to the Efficiency Vermont program as the ENERGY STAR program. Since the inception of the program APT has distributed informational materials that identify the various organizations involved in the program and summarize their various roles in program operation. This piece of retailer recruitment and communications may need to be strengthened or further emphasized in the future.

Table 4-5
Awareness & Participation in Efficiency Vermont Program

Response	% Aware of EVT Program	% Approached by the Program Operator to Participate	% Initially Reported Enrolling in the Program
Yes	100%	58%	25%
No	0%	8%	25%
Don't know	0%	33%	50%
Number of Respondents	12	12	12

In order to learn more about program effectiveness, respondents who initially reported not participating in the program were re-contacted and queried about their experiences with the EVT program. After this effort, five additional respondents were able to provide feedback on their program experience. Thus, a total of eight respondents were asked about their experience with the EVT program.

Program Ratings. Using a scale of 1 to 5 where 1 is 'very poor' and 5 is 'very good', all eight managers were asked to rate three separate elements of the EVT program. This analysis includes the five respondents who initially believed that they did not participate in the program. The managers' ratings of the program's assistance with in-store promotion, staff training, and rebate processing are shown in Table 4-6 below. Feedback is consistently positive, for example:

> *"The EVT people that have come to the store have been very helpful, helped us handle point of sale rebates, etc."*

Table 4-6
Managers' Ratings of Efficiency Vermont Program Aspects

Rating	Assistance with In-Store Promotion	Training for Staff	Rebate Processing
5 – Very Good	63%	25%	38%
4	38%	50%	38%
3	0%	25%	25%
2	0%	0%	0%
1 – Very Poor	0%	0%	0%
Average Rating	4.7	4.0	4.2
Number of Respondents	8	8	8

The managers gave the assistance with in-store promotion an average rating of 4.7, consistently marked 'good' or 'very good'. Managers emphasized that EVT staff is accessible and seek out opportunities to work with retail stores on promotions, displays, and bring enthusiasm to the program.

Staff training received an average rating of 4.0, with scores ranging from 3.0 to 5.0. Managers are satisfied with training provided by EVT, but feel they do not have time to take advantage of their offers. Others explained that the training is very helpful and that their employees have benefited from the opportunity. Their evaluation of rebate processing, with a score of 4.2, was slightly higher with managers reporting that turnaround time is somewhat slower than they would like, but that the process itself is easy.

Managers are generally split as to whether the Efficiency Vermont program has affected their stores' stocking and promotion of Energy Star qualified CFL products. Some managers stated their stores had already stocked and sold CFL products on their own prior to the program. Six of the eight store managers mentioned that the rebates had a large effect on sales and several suggested raising rebate levels.

5 APPLIANCE COMPONENT DESCRIPTION

5.1 PROGRAM DEVELOPMENT

5.1.1 Predecessor Programs

The major Vermont investor-owned and municipal utilities began offering programs to promote retailer support and customer purchase of resource-efficient washing machines in 1997. All Vermont utilities except Washington Electric Coop ran clothes washer incentive programs**.** However, some of the smaller utilities restricted eligibility to customers with electric water heating. The on-site survey conducted for this evaluation found that roughly 35 percent of owner-occupied housing units had electric water heat.

Initially, rebate levels were set at $150. Rebate levels were reduced to $100 per unit in 1998, then to $75 in 1999. Most of the utilities coordinated their work with the national TumbleWash program operated by the Consortium for Energy Efficiency (CEE). The program provided support in negotiation of washer performance standards and testing methods with manufacturers and in coordination of utility activities with the Department of Energy's ENERGY STAR Appliances programs.

In 1998 and 1999, the TumbleWash programs provided rebates for 4,630units, with 2,680 units rebated in 1999. Comparison of program activity to shipment data from the Association of Home Appliance Manufacturers (AHAM) suggests that practically all purchases of resource-efficient clothes washers in these years received incentives through the program.

Table 5-1
Summary of Predecessor Residential Appliance Program Activity

Year	Units Rebated	Key Events
1997		Rebate levels set at $150 per unit.
1998	1,950	Rebate levels reduced to $100 per unit
1999	2,680	In December, rebate levels reduced to $75 per unit.
Total	4,630	

5.1.2 Transition to EVT Management

Upon assuming management of the program, EVT began to offer incentives to all electric customers in the state. Restrictions to residential customers and customers with electric water heating were removed, and EVT reprinted the rebate forms to reflect these changes. The new

rules went into effect in January 2000. APT was retained from the predecessor programs to provide retailer support and rebate processing services.

5.1.3 EVT Program Operations

Customer services and incentives. The key program services and incentives for customers include point-of-purchase rebates for qualifying washing machines supported by various kinds of point-of-purchase advertising and promotional material. Washer rebates were initially set at $100 and lowered to $75 during the first program year. They were reduced in June 2001 to $50.

Marketing. EVT participates in the national ENERGY STAR brand recognition effort and the regional NEEP cooperative advertising campaign. The latter includes television and radio advertisements as well as print ad copy.

Retailer Support. The program offers a number of services to retailers participating in the program, including installation of point of purchase displays, assistance in ordering and stocking qualifying products, and sales staff training. These services are provided by APT, which also provides processing of rebate applications.

5.2 PATTERNS OF CUSTOMER PARTICIPATION

Table 5-2 shows the number of washers rebated by program year since EVT assumed management of the program. The annual number of units rebated held fairly constant from 1999 through 2001, at 2,370 to 2,680, or roughly 20 percent of all clothes washer sales in the state. In the first 2002, the number of rebates issued is down slightly from previous levels.

Table 5-2
Summary of EPP Appliance Component Activity

YEAR	Retailers Participating	Units Rebated	Key Events
2000	91	2,476	
2001	91	2,563	Rebate levels reduced from $75 to $50 in June
2002	91	2,370	
Total		**5,876**	

5.3 PATTERNS OF RETAILER PARTICIPATION

5.3.1 Program Enrollment and Support

APT recruited retailers to participate in the program and enrolled them using the following procedure.

- ***Outreach.*** APT field representatives arranged personal visits with store managers to brief them on the benefits and requirements of program participation.
- ***Enrollment.*** If the store managers agree to participate in the program, they sign a Memorandum of Understanding that summarizes their obligations as well as the services that APT will provide. The retailers' obligations include: undergo staff training, promote consumer education, follow proper coupon redemption procedures, and adhere to the guidelines for approved use of the Energy Star logo and POP materials. APT for its part formally agrees to: provide staff training on the Energy Star program, the EVT program, and sales strategies, deliver and place POP materials, assist with rebate processing, coordinate in-store promotional activities and co-op advertising opportunities, and provide qualified product lists.
- ***Initial product inventory.*** Upon enrollment, APT staff conducts an inventory of appliances on participating retailers' display floor. The initial inventory contains the model number, price, and ENERGY STAR designation of all units *on display* in each store. This inventory is updated semi-annually for a sample of roughly 50 participating stores.
- ***Support Services.*** Once the retailer was enrolled in the program, APT representatives visit the location once every month. During these visits, the field representative installed point-of-purchase displays, replenished stocks of coupons and product literature, and provides list of qualifying products**.**
- ***Sales staff training.*** During routine store visits, sales staff undergo informal training if there is time available**.** Such training covers the promotions and incentives sponsored by the EVT program as well understanding the Energy Star program. In addition, APT representatives provide a 'retailer manual' that contains much of the necessary program information.
- ***Ongoing Product Inventories.*** APT staff conduct shelf inventories of participating retailers every 6 months.

The following paragraphs summarize the key findings from the clothes washer rebate analysis.

5.3.2 Breadth of Retailer Participation

In order to assess EVT's and APT's success in recruiting retailers to the program, we compared the number of appliance, home centers, and discount department stores listed by Dun & Bradstreet to the number of such stores for which rebate records existed in the program database. We found that all but five appliance stores in the D&B database were accounted for in

the program rebate database. Moreover, all Sears locations and a number of other kinds of retail outlets participated in the program.

5.3.3 Rebates by Store Type

In order to investigate the volume of rebates processed by stores of different types, stores listed in the rebate were grouped into one of five categories. Sears stores were given their own category because Sears is a major channel for appliance sales in Vermont, and because the chain processes a large quantity of clothes washer rebates. The independent appliance store category includes participating independent appliance retailers with one or more locations in Vermont, such as Larry's Maytag and Village Appliance. The Major Appliance / Home Center category includes stores such as Home Depot, Lowe's, Best Buy, and Circuit City. Service contractors include hardware stores that sell and service appliances (such as Bisbee's Hardware) as well as gas, oil, and electrical contractors who sell and/or service appliances (such as MacIntyre Plumbing and Heating). The 'Other' category contains all appliance vendors that do not fall into another category, including furniture stores and miscellaneous others.

Error! Reference source not found. summarizes EVT program participation by store type. Over the first 34 months of program operation, the 8 Sears locations in Vermont accounted for 50 percent of all units rebated through the program. Independent appliance stores were the most prevalent in the database with 52 stores (57 percent of the total). These stores processed approximately 38 percent of the clothes washer rebates. The 31 other outlets in the APT database – service contractors, home centers, and "others" – accounted for only 5 percent of units sold through the program. Sears locations averaged 452 rebates per store; the corresponding figure for appliance stores was 53.

Table 5-3
Summary of Participating Locations and Rebates Processed by Store Type

Store Type	Stores		Rebates		Average # Rebates per store
	Number	% of Total	Number	% of Total	
Sears	8	9%	3,612	50%	452
Independent Appliance Store	52	57%	2,767	38%	53
Service Contractor	13	14%	430	6%	33
Major Appliance / Home Center	7	8%	324	5%	46
Other	11	12%	64	1%	6
Total	**91**	**100%**	7,197	100%	79

Trends in distribution of program sales by store type over time. Table 5-4 shows the number and percentage of washer rebates accounted for each of the five store types by year. One pattern that emerges fairly clearly is that Sears' share of program activity has been increasing steadily: from 45 percent in 2000 to 58 percent in 2002. Virtually all of this gain has been at the expense of independent stores.

Table 5-4
Number of Rebates Processed by Store Type and Year, 2000 – 2002*

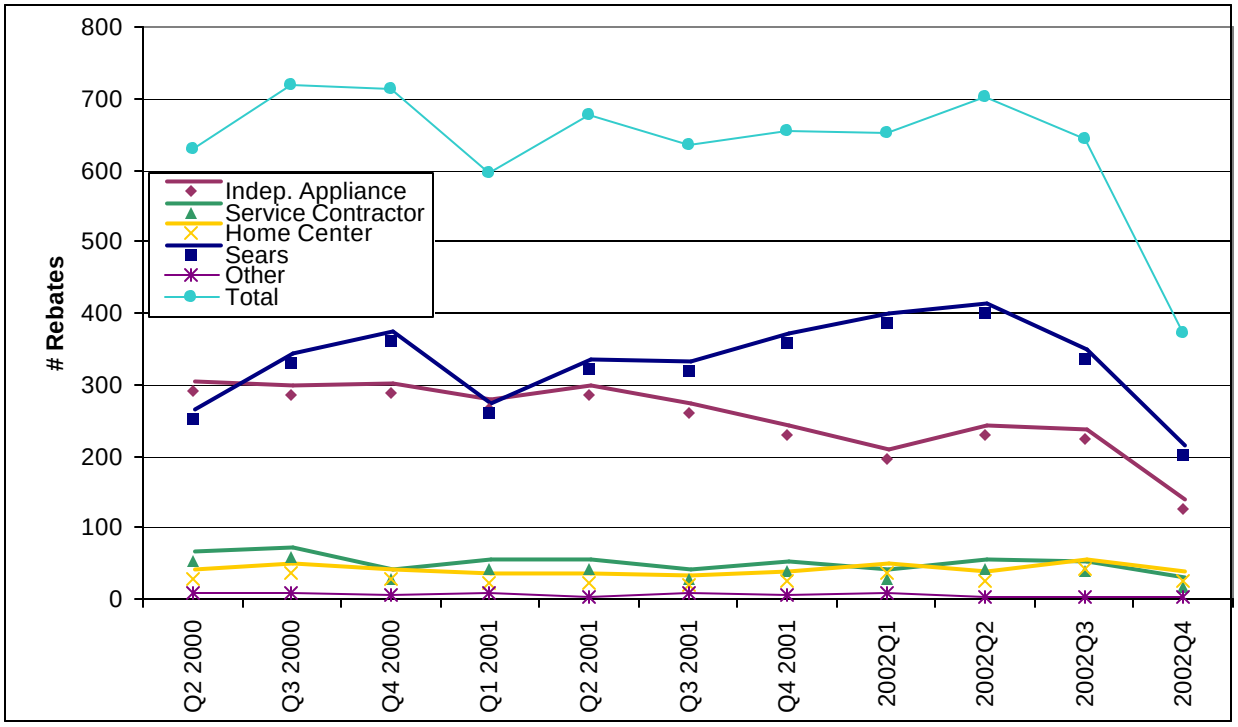
Store Type	2000*		2001		2002	
	# Rebates	% of Total	# Rebates	% of Total	# Rebates	% of Total
Sears	1,118	45%	1,260	49%	1,322	56%
Independent Appliance Store	1,040	42%	1,040	41%	778	33%
Service Contractor	172	7%	149	6%	125	5%
Major Appliance / Home Center	120	5%	88	3%	130	5%
Other	26	1%	26	1%	15	1%
Total	**2,476**	**100%**	**2,563**	**100%**	2,370	100%

* Program began March 2000.

5.3.4 Trend in Volume of Program Activity

As shown in Figure 5-1, the volume of rebates processed each quarter by the program has remained relatively steady at between 600 and 700. However, there appears to have been a fairly steep fall-off in quarterly number of rebates processed beginning in the third quarter of 2002. This may be an artifact of the rebate processing system – retailers could simply have delayed submitting applications. APT has observed this type of behavior, and it shows up in the spike of rebate applications from Sears in the 4th quarter of 2000. In any case, as discussed in Section 6, the apparent slowdown in rebate applications does not seem to be associated with declines in sales or market share of ENERGY STAR clothes washers.

Figure 5-1
Quarterly Rebates Processed by Store Type and Quarter



6 APPLIANCES: BASELINE CONDITIONS & MARKET EFFECTS

6.1 EFFICIENCY STANDARDS AND USEFUL LIVES

Appliance standards and the median useful lives for appliances provide an important framework for interpreting the saturation, vintage, sales, and market share data that appear throughout this section. There are two sets of appliance standards of interest. The first are federal minimum standards authorized by acts of Congress and set through a long, technically exacting, and politically contentious rule-making process. The second are ENERGY STAR® product specifications developed by the Department of Energy in consultation with product manufacturers. These are used to set efficiency standards and testing procedures for products that receive the ENERGY STAR label. Generally, but not in all cases, they are set with reference to the controlling federal minimum efficiency standards for the product in question.

Both the efficiency levels of the ENERGY STAR product specifications and the timing of their release relative to the federal standards affect speed with which manufacturers respond with qualifying models and the costs they face in producing qualifying models. Similarly, these factors affect the savings that customers can achieve by purchasing ENERGY STAR models and the incremental costs of those models relative to standard efficiency products. The paragraphs below summarize recent changes in federal minimum efficiency standards and ENERGY STAR specifications for the four products covered by the Appliance component of the Efficient Products Program. This information is further distilled in Table 6-1.

Clothes washers. The current federal minimum efficiency standards for clothes washers went into effect in 1994, implementing provisions of the National Appliance Energy Conservation Act (1978). These specify an Energy Factor (EF), based on electricity and hot water used in the wash cycle, of 1.18. Beginning in the early 1990s, U. S. manufactures began to develop and distribute much more efficient models, some of which incorporated horizontal axis technology common among European manufactures. These models achieved EFs of 2.5 and above. Supported by incentive programs operated by over 100 utilities across the country, the market share of resource efficient clothes washers (RECWs) increased rapidly from 1996 through 1998. The major Vermont utilities offered incentive programs under the TumbleWash umbrella, which was coordinated at a national level by the Consortium for Energy Efficiency (CEE). In late1997, the U. S. Department of Energy adopted the lower of CEE's two-tiered product specifications, which incorporate an EF of 2.5, for use as the ENERGY STAR specification. In January 2001, the ENERGY STAR program adopted a new method to measure energy efficiency. The Modified Energy Factor (MEF) takes into account the amount of dryer energy used to remove remaining moisture content from items that have been washed. The specified MEF of 1.26 is very similar to the Energy Factor of 2.5, so the change affected the qualifying status of only one model.

In late 2000, the Department of Energy agreed to establish federal minimum standards that are expected to take effect in 2004 at the current ENERGY STAR specification. This new specification was approved by the administration in April 2001. The new provision also includes a second in crease in the minimum federal standard, which will take effect in 2007. This second revision will increase the minimum federal standard to the current ENERGY STAR specification.

Refrigerators. Federal efficiency standards for refrigerators were significantly increased in 1993, resulting in a decrease in Unit Energy Consumption (UEC) for the typical model from 893 to 690 kWh per year at an incremental cost of $86.[1] ENERGY STAR specifications adopted in 1997 required efficiencies roughly 20 percent higher than the federal standards for models of comparable size and features. In July 2001, new federal standards that matched the initial ENERGY STAR standards went into effect. In anticipation of this change in standards, the ENERGY STAR program revised its specifications to require a 10 percent efficiency improvement over the revised federal standard.

Dishwashers. The current federal minimum efficiency standards for dishwashers took effect in 1994. There are no plans to alter the standard. The ENERGY STAR dishwasher specifications (1997) require an EF of 0.52 versus 0.46 for the federal standard. The ENERGY STAR specifications were increased in January 2001 to EF = .58.

Room Air Conditioners. Changes in both federal and ENERGY STAR efficiency standards for room air conditioners went into effect in October 2000. Currently, only louver-sided units without heating functions are considered for ENERGY STAR status. The new ENERGY STAR criteria are 10 percent above the new federal standard (rounded to the nearest decimal).

[1] Koomey, Jonathan et al. (1998). *Projected Regional Impacts of Appliance Efficiency Standards for the U.S. Residential Sector*: Berkeley, CA, Lawrence Berkeley National Laboratory.

Table 6-1
Summary of Appliance Efficiency Standards

	Clothes Washers	Refrigerators	Dish Washers	Room Air Conditioners
Federal Efficiency Standards				
Effective date of current standard	1994	July 1, 2001	1994	Oct. 1, 2000
Typical reduction in UEC from previous	Negligible	20%	20%	10%
ENERGY STAR specification				
Effective date of current spec.	Jan. 1, 2001	Jan. 1, 2001	Jan. 1, 2001	Oct. 1, 2000
Typical reduction in UEC from previous	Negligible– change in metric	10%	11%	n/a
Typical reduction from federal standard	~40%**	10%	21%	10%
Typical energy savings from standard (See Appendix E for Assumptions)	500 – 700 kWh/Yr	70 – 100 kWh/Yr		
Efficiency metric	EF for Federal/ MEF for E STAR	UEC	EF	SEER
Current level	EF ~ 2.5 MEF = 1.26	Varies by size	0.58	Varies by size: 10.7 - 9.4
Useful Life*	14 years	14 years	12 years	12 years

* From Koomey (1998)

** Also water savings of 6000 – 7000 gallons per year.

6.2 THE CONSUMER MARKET

6.2.1 Housing Stock and Appliance Saturation

Count of housing units. The 2000 United States Census counted a total of 294,382 housing units in Vermont, of which 240,634 or 81.7 percent were occupied. Of the 53,748 vacant units, 43,060 were for seasonal or recreational use. We thus consider them to be in active use, and they should be counted in any process of estimating the stock of appliances installed in Vermont homes. The same can be said of housing vacant housing units that are for rent or that have been rented or sold but not yet occupied. Thus, the total number of households used to estimate the size Vermont's residential appliance stocks is 288,159.[2] See Table 6-2 for summary information about the Vermont housing stock.

[2] For purposes of estimating energy savings, it would be appropriate to determine whether appliances purchased with rebates are intended for permanent or seasonal residences, given that usage in seasonal residences is likely to be considerably less than usage in homes that are occupied year-round.

Table 6-2
Number and Occupancy Status of Vermont Housing Units
U. S. Census, 2000

	Occupancy Status	Percent of Total
Total Housing Units	294,382	
Occupied Units	240,634	81.7%
Vacant Units	53,748	18.3%
For rent	3,084	1.0%
For sale only	2,393	0.8%
Rented or sold: not occupied	1,381	0.5%
Seasonal, recreational	43,060	14.6%
For migratory workers	46	0.0%
Other	3,784	1.3%
Base for Saturation Calculations	288,159	98.0

Other key characteristics of the Vermont housing stock to consider in interpreting appliance saturation and sales information are as follows.

- ***Tenure.*** Seventy-one percent of Vermont's occupied housing units are owner-occupied; 29 percent are occupied by renters.
- ***Distribution by type of structure.*** Sixty-six percent of Vermont housing units are in single-family detached structures; another 3.4 percent are single-family attached homes. Nearly eight percent of Vermont housing units are mobile homes, and 11.5 percent are in 2 – 4 family structures.
- ***Share of new construction.*** According to the Census, 13.7 percent of all Vermont housing units had been built since 1990. The Census also reported that 5,212 units had been constructed between January 1999 and March 2000.

Saturation and vintage of appliances with ENERGY STAR specifications. The on-site survey of existing homes collected information on the number and age of various kinds of appliances present in the home. Table 6-3 summarizes the findings on holdings of ENERGY STAR-covered appliances and provides an estimate of the number of those appliances in the housing stock, based on the estimate of relevant housing units discussed above and the mean number of the appliances in the sample homes.

All of the homes in the sample were owner occupied. Therefore the saturations for clothes washers and dishwashers may be somewhat higher than they would be for the population as a whole. The rows in Table 6-3 labeled "Adjusted for Renters" show estimated saturations given the percentage of renters in occupied housing units and the ratio of appliance saturations for

renter and owner occupied households developed from the 1997 *Residential Energy Consumption Survey*.

Table 6-3
Saturation and Stock of ENERGY STAR-covered Appliances

	Percent of Housing Units		
On-Site Results	**1 or more**	**2 or more**	**Mean/HH**
Refrigerator	100%	14%	1.14
Clothes Washer	94%	1%	0.96
Dishwasher	54%	-	0.54
Room Air Conditioner	27%	12%	0.38
Adjusted for Renters			
Refrigerator	100%	11%	1.11
Clothes Washer	80%	0%	0.8
Dishwasher	47%	0%	0.47
Room Air Conditioner	25%	6%	0.31

Table 6-4 shows the distribution of appliances by age as reported by the survey respondents. The median age for dishwashers, refrigerators, and clothes washers is 6 – 7 years, which is consistent with their manufacturer-rated useful lives. The median age for room air conditioners in the sample household is less than five years. However, 16 to 19 percent of the appliances are older than 15 years, and some are older than 20 years. This pulls up the average of appliances in each category. Over 35 percent of refrigerators in the sample were purchased before the 1993 federal efficiency standards went into effect. Replacement of this cohort of refrigerators represents a large pool of energy potential savings.

Table 6-4
Age Distribution of ENERGY STAR-covered Appliances

	Appliance Age (in Years)								
Appliance	**< 2 years**	**2 – 5**	**5 – 10**	**10 –15**	**15 – 20**	**> 20 years**	**Mean Age (Years)**	**Age Range (Years)**	**N**
Dishwasher	32%	11%	30%	11%	5%	11%	9.00	0.75 - 28	37
Refrigerator	21%	18%	26%	19%	8%	8%	9.46	0.25 - 34	77
Clothes Washer	20%	20%	28%	13%	9%	10%	9.19	0.25 – 26	69
Room Air Conditioner	36%	20%	8%	20%	12%	4%	8.76	0.5 - 44	25

6.2.2 Saturation of ENERGY STAR Appliances in New Construction

As part of the on-site survey, auditors collected information on the ENERGY STAR status of appliances that were purchased for the new home. Table 6-5 shows the number of appliances that were purchased for the new homes (as opposed to brought from the occupant's prior home) and the number of those appliances that qualified for the ENERGY STAR label. The market share for ENERGY STAR clothes washers was significantly higher in the new construction sample than in the population as a whole: 47 percent versus 31 percent in 2000 and 37 percent in 2001. There was little difference between the new construction sample and the population as a whole in terms of the ENERGY STAR share of refrigerators and dishwashers.

Table 6-5
ENERGY STAR Share of Appliances Purchased for New Homes
n = 159

Appliance	# Purchased for New Home	# with Valid Model Numbers	Number w/ E STAR Label	Percentage w/ E STAR Label
Refrigerator	150	140	38	27%
Clothes washer	101	87	41	47%
Dishwasher	130	116	42	36%

6.2.3 Clothes Washer Sales and ENERGY STAR Market Share

We present the results of our sales and market share analyses for clothes washers separately from those for the remaining appliances for a number of reasons. First, resource efficient clothes washers were eligible for incentives through the EPP and its predecessor programs. Thus, we need to estimate levels of sales in and outside the program. Second, the level of program resources expended for this measure warrant close examination. Finally, the data sources available on clothes washer sales and ENERGY STAR market share are relatively rich compared to those available for the other appliances. We begin this section with a discussion of the data sources used, focusing on data collection methods, coverage, and limitations. We then move on to develop estimates of total clothes washer sales, ENERGY STAR market share, and unrebated sales going back to 1998. We conclude the section by comparing these results to ENERGY STAR market share figures from states with and without incentive programs.

Data Sources

XENERGY used the following data sources in compiling estimates of clothes washer sales and ENERGY STAR market share.

Monthly store sales records collected by APT. As part of its contracted program support services, APT collected monthly totals of clothes washer unit sales for ENERGY STAR and conventional models from a subset of stores participating in the program. These records are

available from May 1998 through October 1999. In 1998, records were collected from 44 stores, including three of the eight Sears branches in the state. In subsequent years, Sears reported its sales data to the Department of Energy's national ENERGY STAR Appliance sales tracking system, and discontinued reporting to APT. The number of stores from which data were collected in the years 1999 through 2001 ranged from 51 to 54. These were primarily independent appliance stores which accounted for roughly 40 percent of program rebates during the period covered.

National ENERGY STAR Appliance Sales Tracking System. Through its national ENERGY Star Appliance program support contractor, D&R International, the U. S. Department of Energy collects sales information from six national appliance and department store chains. Only one of these chains – Sears – has locations in Vermont. Due to the sensitive nature of these data and the limited number of establishments reporting, the DOE system only reports the market share for ENERGY STAR appliances and not the total number of units sold. These data have been reported made available on a quarterly basis since the second quarter of 1998 and are available through the second quarter of 2002.

Association of Home Appliance Manufacturers (AHAM) Distributor Sales Estimates. AHAM is the industry association of home appliance manufacturers. It collects data on its members' shipments to distributors by appliance type, state, and ENERGY STAR designation. The correspondence between total units shipped and sales at the state level appears to be close, but not exact. There is some lag between the time units are shipped to retailers' warehouses and the time they are actually sold. Also, the use of regional wholesale buyers and warehouse facilities makes it difficult to allocate shipments precisely to states. Thus, unit shipments reported by AHAM may under or overstate sales in a given year.

The ENERGY STAR market share in a given year tends to be somewhat higher in the AHAM series than it is in the DOE reports. The APT data described above suggest that independent stores sell a higher share of ENERGY STAR appliances than do the national chains represented in the DOE data. Recent appliance market share studies carried out in California found the same pattern.

XENERGY analysis of appliance sales data from independent dealers in Vermont and Maine. As part of the evaluation research, XENERGY and APT collected and analyzed sales records for the four ENERGY STAR appliances from five independent dealers in Vermont and from 5 similar locations in Maine. These stores furnished records of over 24,000 transactions from dating from 1999 through 2001. The records included model numbers and dates for each transaction. XENERGY quality-controlled all model numbers to ensure that they appeared in manufacturers' catalogs and that the ENERGY STAR designation was correct.

One objective of this data collection was to compile information on ENERGY STAR market share for refrigerators, room air conditioners, and dishwashers from stores that were not covered by the DOE national effort. A second was to assess the accuracy of the APT monthly sales data collection process. The independent analysis of sales records resulted in an estimate of total unit

sales for the period 1999 – 2001 that was 5 percent higher than the sum of monthly sales reported to APT for the five Vermont stores. The number of ENERGY STAR units identified in the independent analysis was 2 percent lower than that developed from the APT monthly reports. These results indicate that the APT monthly data are likely to be sufficiently accurate for developing estimates of clothes washer sales and ENERGY STAR market share. We have not made any adjustments to those data.

Program Rebate Database. XENERGY used the analysis of the program rebate database described in Section 5, as well as reports to DPS on predecessor programs to develop estimates of the total number of clothes washers for which incentives were paid each year.

Estimates of Clothes Washer Unit Sales and ENERGY STAR Market Share

Table 6-6 summarizes estimates of clothes washer unit sales, ENERGY STAR market share, rebate totals, and unrebated sales, year by year from May 1998 through October 2001. The key findings to be derived from Table 6-6 are as follows.

- ***The utility rebate programs had a significant impact on market share by 1998.*** Only one year after the introduction of the Vermont utilities' Efficient Products Program, the market share of ENERGY STAR washers had reached 24.9 percent. Among independent dealers, the ENERGY STAR share was 31 percent. The rapid uptake was likely due to the high rebates offered -- $150 at the beginning of the program. Virtually all sales of ENERGY STAR models in 1998 were made with program subsidies. The national market share for ENERGY STAR clothes washers among the national chains reporting to DOE was 6.2 percent for the last two quarters of 1998.

Table 6-6
Clothes Washer Unit Sales and ENERGY STAR Market Share

Year	1998	1999	2000	2001
Months Covered	**May – Dec**	**Jan – Dec**	**Jan – Dec**	**Jan - Oct**
AHAM Distributor Sales Estimates	7,867	12,000	12,500	9,375
APT Monthly Sales Reports: Independent Retailers				
EnergyStar Clothes Washer Unit Sales	1,535	2,229	2,201	2,121
Standard Efficiency Clothes Washer Sales	3,419	5,647	4,933	3,623
Total Independent Retailer Unit Sales	4,954	7,876	7,134	5,744
ENERGY STAR as % of Total Sales	31%	28%	31%	37%
Sears Sales as Remainder from AHAM Distributor Sales Estimates				
Sear Sales as Remainder	2,913	4,124	5,366	3,631
% ENERGY STAR (DOE/D&R Estimate)	14.5%*	22.6%	22.6%	25.1%
Sears ENERGY STAR unit sales	422	932	1,213	911
ENERGY STAR Unit Sales and Market Share				
Total ENERGY STAR unit sales	1,957	3,161	3,414	3,032
ENERGY STAR Market Share weighted avg.	24.9%	26.3%	27.3%	32.3%
ENERGY STAR share of shipments (AHAM)		22.7%	22.6%	24.9%
U. S. Market Share (per DOE)	*6.2%**	*8.5%*	*9.3%*	*10.3%*
ENERGY STAR Share of Shipments (AHAM)		*8.5%*	*9.5%*	***11.3%***
Sales of ENERGY STAR Clothes Washers Outside the Program				
Units for which incentives were paid	1,950	2,680	2,476	1,922
Unit Unrebated Sales	7	481	938	1,110
% of unit Unrebated Sales	1%	15%	27%	37%

* Average for last two quarters of 1998.

- ***The market share of ENERGY STAR clothes washers sold by independent stores was consistently higher than that for the national chains.*** Even if we discount the last two quarters of 1998 as a transitional period, the ENERGY STAR market share among independent stores averaged 30 to 40 percent above shares realized by chain stores. This result may reflect the greater involvement of proprietors and managers on the sales floor in small stores compared to chains.
- ***Throughout the period covered, the share of ENERGY STAR washers sold in Vermont was three times the national market share.*** Vermont's ENERGY STAR market share grew from 24.9 percent in 1998 to 32.3 percent in 2001. During the same period the national market share, as measured by DOE increased from 6.2 percent to 10.3 percent. As mentioned above, it is likely that the market share for the national chains is a few percentage points below the actual share, once sales through independents are taken into account. See the figures presented for share of AHAM shipments.

- ***Unrebated sales have grown consistently.*** The portion of total ENERGY Star clothes washer sales that were not supported by rebates grew from one percent during the last two quarters of 1998 to 15 percent in 1999. This trend continued, with the portion of total unrebated sales increasing to 27 percent in 2000 and 37 percent in 2001. This result suggests that market transformation – that is increased customer knowledge and acceptance of an efficient product in the face of declining incentives – has occurred in Vermont's residential clothes washer markets. DOE market share figures and rebate levels for the first two quarters of 2002 suggest that the growth of unrebated sales is continuing. The market share for ENERGY STAR clothes washers in Vermont Sears locations increased from 25.1 percent for calendar 2001 to 33.5 percent in 2002. During the same period rebates issued declined to an annual rate of about 2,000 units.

Vermont ENERGY STAR Clothes Washer Market Share: Comparison to Other States

To put the trend in Vermont's ENERGY STAR clothes washer market share in perspective, we grouped states into two sets: those that had active incentive programs to support ENERGY STAR washer sales during at least two of the three years 1999 – 2001; and those that did not. The states in the first category were: California, Connecticut, Massachusetts, New Hampshire, Oregon, Wisconsin, Rhode Island, Vermont, Montana, and Washington. We relied on program reports from the Consortium for Energy Efficiency to characterize the states for program purposes.

We then compiled the annual ENERGY STAR washer market share figures for each of the states from the DOE database for the years 1999 – 2001. We used the DOE figures, despite their limited coverage because they measure sales (as opposed to shipments) and because they were available in a timely manner up through the second quarter of 2002. Table 6-7 summarizes the comparison of the market shares for Vermont and the two groups of states.

Table 6-7
Comparison of ENERGY STAR Clothes Washer Market Share
(Retailers reporting to DOE Market Tracking System Only)

Year	1998**	1999	2000	2001	2002
Vermont					
Market Share Energy Star	10.5%	22.6%	22.6%	25.1%	33.5%
Other NEEP States					
Connecticut		15.3%	18.2%	20.0%	25.5%
Massachusetts		16.2%	17.8%	20.0%	24.9%*
New Hampshire		16.3%	18.2%	19.5%	30.4%
States with Incentives: Energy Star Market Share					
Median		15.5%	18.0%	20.0%	25.7%
Maximum		22.6%	22.6%	26.9%	45.0%
Minimum		11.0%	10.0%	12.5%	22.8%
States with No Promotions or Incentives					
Median		7.0%	7.5%	10.2%	14.3%
Maximum		26.0%	29.8%	33.6%	45.0%
Minimum		3.3%	2.8%	3.4%	6.6%
US Average					
Market Share of ENERGY STAR CW	5.5%	8.5%	9.3%	10.3%	16.3%

* Massachusetts utilities except for the Cape Light Compact suspended CW rebates in 2002.

** For full year. Figures in Table 6-5 are for the third and fourth quarters only.

The key findings illustrated in Table 6-7 are as follows.

- ***Even among states that have had strong incentive programs, Vermont has had the highest market share of ENERGY STAR washers of any state, in some years by a considerable margin.*** In 2002 Vermont came in second to Oregon in this particular sweepstakes, but only by a small margin.
- ***Comparison to no-program baseline.*** The median market share among the 40 states with no program could be viewed as an approximate baseline market share in the absence of any programs. From 1999 through 2001, the difference between Vermont's market share and that of the no-program group held steady at 14 – 15 percent. In 2002, sales of ENERGY STAR qualifying models appear to have taken off rapidly in Vermont and in all other groups of states. Still the market share in Vermont was double that in the nation as a whole.
- ***Patterns of growth.*** Despite the large differences in the absolute value of the market shares for Vermont and the various groups of states, their pattern of growth over the four years for which data are available and the percentage growth are remarkably similar. For Vermont and the country as a whole, we can see a significant increase from 1998

followed by three years of relatively stable market shares, then a rapid increase again in 2002. The compound rate of growth over the periods for which data are available are also fairly similar. The compound growth rate in Vermont's market share from 1998 through 2002 is 35 percent versus 30 percent for the country as a whole. When we look at the period from 1999 to 2002, the growth rates for all groups is very similar, ranging from 13.5 percent for Vermont to 17 percent for the no-program states and the country as a whole. Among states with active incentive programs, the growth rate was 16.5 percent.

These findings suggest a number of hypotheses about what is going on in the consumer side of the market for resource efficient clothes washers.

- ***Consumers perceive value in ENERGY STAR washers independent of program promotion.*** The relatively rapid growth in the market share in states where there are no promotion programs, as well as the growth in unrebated sales in Vermont suggest that a significant share of customers perceive value in the product independent of program promotion. This steady and broad pattern of growth in market share stands in contrast to the growth pattern of other consumer products that have received support from utility and regional energy efficiency programs. For example, even after a decade of steady utility program support, the percentage of Northeast households with CF bulbs installed appears to have reached 30 to 35 percent by the mid-nineties and has moved very little since then.[3] Nationally, recent sales figures reported in Section 3 suggest that no more than 12-15 percent of homes nationwide have CF bulbs installed. Moreover, interviews with retailers in Vermont and in other states where programs were interrupted due to changes in regulation and management suggest that sales fell off significantly during the program hiatus.
- ***Evidence of diffusion pattern – importance of early program gains.*** The formula for compound annual growth is the simplest form a product diffusion model. Diffusion models forecast market share in time $t+1$ based on the market share in time t. The similarity in compound growth rates among the groups of states characterized by program level suggests that a process of diffusion may be occurring independent of program support. Moreover, despite having very similar programs, the other NEEP states did not show Vermont's high absolute values of market share from 1999 onward. These findings suggest that the current high levels of ENERGY STAR clothes washer market share in Vermont owe a great deal to the rapid increase of sales early in the program.
- ***Changes on the supply side.*** The broad growth in market share for ENERGY STAR washers has also likely been supported by a number of key developments on the supply side. The number of qualifying models grew from 35 in 1999 to a current level of 106. Moreover manufacturers have introduced a significant number of qualifying vertical axis

[3] The 1998 Northeast Residential Lighting Baseline study found that 30 percent of its regional sample of 1,170 customers reported having CFLs installed. Thirty-eight percent of the single-family homes in the Vermont on-site sample had CFLs installed.

models that cost several hundred dollars less than the horizontal axis models that dominated the qualifying product catalog earlier.

6.2.4 Sales and ENERGY STAR Market Share for Refrigerators, Dishwashers, and Room Air Conditioners

Data Sources

Description of Sources. The following paragraphs present estimates of unit sales and ENERGY STAR market share for the three other appliances covered by the EPP program: refrigerators, dishwashers, and room air conditioners. For the most part, these estimates and the accompanying analysis use the same data sources as the clothes washer estimates, with the following differences.

- Monthly sales records for sales of refrigerators, dishwashers, and room air conditioners were not collected from independent retailers participating in the program. For the estimates reported below, we rely on the analysis of sales records from five independent appliance stores in Vermont. We use the average share for the five Vermont stores to represent the share for independents. The analysis is described in Section 6.2.2. See Appendix D for a detailed discussion of the attributes of the sample stores for the sales analysis.
- D&R International furnished estimates of the percentage of AHAM shipments accounted for by total unit sales recorded in their sales database by state. We used this factor to develop a weighted average ENERGY STAR market share that reflected the relative portion of total sales accounted for by chains and the independents.
- AHAM compiles and publishes data on the ENERGY STAR share of appliance shipments by state and for the country as a whole on a quarterly basis. For smaller states, AHAM's estimates of total units shipped and ENERGY STAR market share are subject to considerable inaccuracy. The data AHAM receives from manufacturers come in the form of shipments to distributors. Much of the product sold in Vermont is initially shipped to regional distribution centers. Thus, a considerable share of the product purchased in Vermont is initially shipped to other states. AHAM estimates the total number of units shipped to Vermont by allocating regional figures based on the share of households in the regional market area. The market shares of ENERGY STAR products provided by AHAM are almost exactly the same as the shares estimated using the DOE database. Thus, it seems likely that AHAM uses the DOE database more or less directly for estimating Vermont's ENERGY STAR market share.
- During the period under study, there were several large-scale incentive programs for refrigerators active in the U. S. These included programs operated by California and Connecticut investor-owned utilities. There were also instances of incentive programs offered by single utilities (mostly smaller ones) in a few states. Thus, we developed two categories of program levels for grouping states. The program category includes all

states that had ENERGY STAR promotion programs similar to Vermont's in operation over all or most of the state during at least two of the three years 1999 – 2001. There were 11 such states.

- XENERGY and APT also collected and analyzed sales information from 5 independent retailers in Maine.

Discrepancy in market share estimates using different methods. Given the roster of sources described above, there are two methods available to develop statewide estimates of market share for the three ENERGY Star appliances in Vermont. The first is simply to use the AHAM state-level shipment data, which theoretically represent share of appliances that will make their way into show rooms and from there into consumers' homes over the course of a year or so. The other is to develop a weighted average of chain and AHAM market share data, using the DOE data to represent the share sold by Sears and the results of the sales analysis conducted by XENERGY to represent the share sold by independents. These two approaches produce very different results, as shown in Table 6-8.

Table 6-8
Comparison of Market Shares: Weighted Average v. AHAM

Year	1999	2000	2001
Refrigerators			
Vermont Chain (DOE)	28.1%	31.0%	14.9%
Vermont Independent	12.0%	13.0%	8.0%
Weighted Average	19.4%	21.2%	11.2%
AHAM Shipments	*22.7%*	*30.7%*	*13.8%*
Dishwashers			
Vermont Chain (DOE)	7.5%	8.1%	14.8%
Vermont Independent	51.0%	58.0%	64.0%
Weighted Average	34.7%	39.4%	45.6%
AHAM Shipments	*7.3%*	*8.2%*	*14.5%*
Air Conditioners			
Vermont Chain (DOE)	12.2%	22.0%	19.8%
Vermont Independent	12.0%	13.0%	3.0%
Weighted Average	12.1%	17.1%	10.7%
AHAM Shipments	*11.0%*	*21.8%*	*18.6%*

It would be tempting to use the AHAM shipment data and dismiss the results of the analysis of independent store pending the availability of sales data from a larger sample. However, we believe the use of the data from the small sample of independents yields a more plausible estimate of market share. In support of this approach we cite the following.

- ***The direction of the differences between the chain and independent market shares are not the same for all appliances.*** In the case of dishwashers (and clothes washers as discussed above) the ENERGY STAR share is significantly higher for independent sample than for the chain. This order is reversed for refrigerators and room air conditioners.
- ***The pattern of differences between market shares for chains and independents is virtually the same in Vermont and Maine.*** See 6-9. These trends were not only consistent between the samples for the two states, but among all 10 stores in the sample.
- ***Similar patterns of difference between chain and independent ENERGY STAR market share have been found in other studies.*** In California, researchers found that the market share for ENERGY STAR clothes washers and dishwashers was significantly higher among independents than among chains during the period 1999 -- 2000. The situation was reversed for room air conditioners. The market share of ENERGY STAR refrigerators for the two channels were roughly equal over the two-year study period.[4]

Table 6-9
Comparison of Market Share Estimates
For Chains and Independents: Maine

Appliance/Source	1999	2000	2001
Refrigerators: DOE	25.0%	29.1%	12.7%
Refrigerators: Independent	5.0%	4.0%	6.0%
Dishwashers: DOE	8.0%	10.2%	12.3%
Dishwashers: Independent	21.0%	25.0%	39.0%
Room AC: DOE	24%	21.3%	21.7%
Room AC: Independent	10.0%	11.0%	1.0%

Refrigerators

Analysis of trends in the market share of ENERGY STAR refrigerators is complicated by the introduction in January 2001 of new ENERGY STAR specifications, six months in advance of the effective date of the related federal energy standards. The timing factor led to reduced availability of qualifying products in Vermont and in the nation as a whole, and contributed to a sharp decrease in ENERGY STAR market share from 2000 to 2001. The change also resulted in a decrease in the average savings consumers could realize by selecting an ENERGY STAR model versus one that met federal minimum standards, as well as an increase in the incremental cost. Table 6-10 presents the key results of the refrigerator market share analysis.

[4] Regional Economic Research, Inc. (2001) *California Residential Efficiency Market Share Tracking: Appliances 2001*. San Diego: Southern California Edison, September 2001.

Table 6-10
Refrigerator Shipments and ENERGY STAR Market Share
Vermont, U.S.

Year	1999	2000	2001	2002
Annual Shipments (AHAM)	12,700	12,000	13,100	
Market Share ENERGY STAR				
VT: Chains (45.9% of Total)	28.1%	31.0%	14.9%	24.8%
VT: Independents, n = 5	12.0%	13.0%	8.0%	
VT: Weighted Average	19.4%	21.2%	11.2%	
AHAM Shipments	22.7%	30.7%	13.8%	
DOE Market Share (Chains)				
Other NEEP States				
Connecticut	15.3%	18.2%	20.0%	25.9%
Massachusetts	16.2%	17.8%	20.0%	25.4%
New Hampshire	16.3%	18.2%	19.5%	26.8%
States with Promotion Programs				
Median	26.1%	27.5%	16.6%	22.9%
Maximum	32.2%	35.3%	25.5%	26.8%
Minimum	23.5%	22.5%	12.4%	18.5%
States with No Programs				
Median	24.5%	27.0%	15.9%	18.3%
Maximum	35.2%	38.7%	20.8%	27.0%
Minimum	18.0%	16.5%	7.9%	12.7%
US Average	24.4%	27.0%	17.3%	20.7%

The key findings to be drawn from Table 6- are as follows.

- ***Comparison between program areas before and after change in ENERGY STAR specifications.*** In 1999 and 2000, there was little difference in the market share of ENERGY STAR refrigerators between Vermont, other states with promotional programs, states with no programs, and the country as a whole. There may be a number of potential explanations for this pattern. Generally, the appliance programs had only begun in late 1998, following the delayed release of the ENERGY STAR refrigerator specification. Second, the related federal minimum guideline had been in effect since 1993. This was sufficient time for manufacturers to develop the high-ends of their product lines, which often packaged energy efficiency with other product features that consumers were willing to pay for. Third, at least through the first half of 2000, incremental prices for efficient refrigerators were relatively modest. In Vermont, the average incremental cost for ENERGY STAR refrigerators on display floors in 1999 was $278, versus the average cost

for a standard model of $841. (For a fuller discussion of stocking and pricing practices, see Section 6.3.

In the first year after the change in specifications (January 2001) the market share of ENERGY STAR refrigerators fell precipitously, especially in Vermont. There the 2001 share for chain stores was 14.9 percent, compared to 17.3 percent for the country as a whole. However, the promotion programs appear to have played an important role in rebuilding the share for ENERGY STAR refrigerators. In Vermont, the ENERGY STAR market share reached 24.8 percent in 2002, an increase from the previous year of two-thirds. Trends in other states with promotional programs are similar. Over the same period, the ENERGY STAR share of refrigerators in the country as a whole increased from 17.3 percent to 20.7 percent.

- ***Comparison of chain to independent retailers.*** The estimated market share of ENERGY STAR refrigerators sold by chain stores in Vermont is significantly higher than that for independents in each year. This is exactly the opposite of the relationship observed for clothes washers and dishwashers (see below).
- ***Comparison to other NEEP Program States.*** Market share for ENERGY STAR refrigerators sold through chain stores were generally higher in Vermont than in the other NEEP states through 2000. In 2001 and 2002, the market shares in these states were roughly the same.

Dishwashers

Table 6-11 summarizes shipment and market share information for dishwashers. The following key observations can be derived from the table.

- ***Difference between chain and independent stores.*** As was the case for refrigerators, the share ENERGY STAR dishwashers sold by independents is significantly different than the share sold by chains. However, in the case of dishwashers, the relative position is reversed. From 1999 through 2001, the ENERGY STAR for the five independent stores rose from 51 to 64 percent. Over the same period, the share for Sears rose from 7.5 to 14.8 percent.
- ***Comparison to California.*** The estimates of the Vermont's ENERGY STAR dishwasher share for independents and hence the state as a whole appear to be very high. However, the California study found that the ENERGY STAR share for independents had reached 50 percent in 2000, and that the statewide share had reached 31.6 percent.
- ***Comparison to other NEEP states.*** Vermont's market share of ENERGY STAR dishwashers sold through the chain store channel was generally a bit lower than the shares in the other NEEP states for the years for which all four quarters of data are available. However, the pattern is not consistent.
- ***Comparison to states with no programs.*** The states without incentive programs had a higher median ENERGY STAR market share for dishwashers than the group with incentive programs in place.

Table 6-11
Dishwasher Shipment and Market Share
Vermont, U.S.

Year	1999	2000	2001	2002
Annual Shipments (AHAM)	9,100	9,300	8,500	
Market Share ENERGY STAR				
VT: Chains (37.4% of Total)	7.5%	8.1%	14.8%	27.5%
VT: Independents	51.0%	58.0%	64.0%	
VT: Weighted Average	34.7%	39.4%	45.6%	
Energy Star share (AHAM)	7.3%	8.2%	14.5%	
DOE Market Share (Chains)				
Other NEEP States				
Connecticut	9.9%	9.9%	14.2%	37.8%
Massachusetts	12.0%	11.9%	17.0%	34.1%
New Hampshire	13.3%	13.6%	15.3%	21.9%
States with Promotion Programs				
Median	9.6%	9.9%	14.8%	33.8%
Maximum	17.2%	15.2%	22.7%	39.3%
Minimum	5.9%	6.5%	13.1%	21.9%
States with No Programs				
Median	10.6%	9.7%	12.3%	34.4%
Maximum	16.7%	14.5%	17.3%	44.5%
Minimum	1.9%	1.1%	2.9%	18.0%
US Average	12.4%	10.9%	19.9%	36.4%

Room Air Conditioners

Virtually all sales of room air conditioners occur in the second and third quarters. Thus, meaningful results from the DOE database are not available for 2002. The changes in market share from year to year show a rapid increase from 1999 to 2000, followed by a decline in Vermont and in the country as a whole in 2001. This decrease is likely related to the change in ENERGY STAR specifications that took effect in October 2000. The patterns of ENERGY STAR market share for room air conditioners appear similar to those for refrigerators. There is little difference between states with and without programs, and chains tend to sell a higher share of efficient products than independents. One other result is noteworthy: the market share for ENERGY STAR room air conditioners in Vermont kept pace with the national average in 1999 and 2000, and was significantly higher in 2001, following the introduction of new standards. The ENERGY STAR market share for room air conditioners more than tripled nationwide between 2001 and 2002, increasing from 11.5 to 35.7 percent. Vermont's ENERGY STAR market share also

tripled in this period, moving from 19.8 to 61.3 percent. These figures likely reflect the results of a rebate program put into effect for the summer of 2002. See Table 6-12.

Table 6-12
Room Air Conditioner Shipment and Market Share
Vermont, U.S.

Year	1999	2000	2001	2002
Annual Shipments (AHAM)	7,800	8,600	6,100	
Market Share ENERGY STAR				
VT: Chains (45.6% of Total)	12.2%	22.0%	19.8%	61.3%
VT: Independents	12.0%	13.0%	3.0%	
VT: Weighted Average	12.1%	17.1%	10.7%	
DOE Market Share (Chains)				
States with Promotion Programs				
Median	13.3%	20.3%	21.5%	47.4%
Maximum	17.8%	26.2%	31.1%	61.3%
Minimum	3.5%	10.9%	15.7%	26.6%
States with No Program				
Median	11.9%	18.6%	17.7%	30.5%
Maximum	23.8%	23.4%	24.7%	55.4%
Minimum	3.5%	4.9%	0.3%	20.8%
US Average	13.3%	18.9%	11.5%	35.7%

6.2.5 Consumer Awareness and Knowledge of Efficient Appliances

Theoretically, consumer awareness of the availability of energy-efficient products and the performance advantages they furnish should be associated with purchase of those products. So too should be the intensity of customer concern for broader advantages, such as reduced environmental damage. The research plan for Phase 1 of the EPP did not contain a broad-based survey of customer awareness, knowledge, and attitudes in regard to efficient appliances. However, information on these characteristics of Vermont consumers is available from the following sources.

- **1999 Appliance and TumbleWash Baseline Studies.** Vermont utilities with active energy efficiency programs commissioned a baseline study of the state market for energy efficient appliances in 1999. This study included a telephone survey of a random statewide sample 150 customers who had not, at that point, taken part in the TumbleWash program. The questionnaire for this study contained a number of items concerning recognition and understanding of the ENERGY STAR label, recent appliance purchases, and the prospective use of the ENERGY STAR label in appliance purchases.

- **2000 and 2001 ENERGY STAR Household Survey.** The Consortium for Energy Efficiency (CEE) sponsored national surveys of customer recognition, understanding, and use of the ENERGY STAR label in 2000 and 2001. The project included a core national mail survey of 3,994 households in 2000 and 1,995 households in 2001. The 2001 study was supplemented by an on-line survey administered to a panel of 1,810 households using the WebTV service. The geographic areas covered by the survey (Designated Market Areas or DMAs) were classified according to the level of ENERGY Star promotion they had experienced in recent years. The definitions for the publicity groups were as follows.
    - ***High publicity*:** At least two *recent* years of *sustained* promotions and publicity from non-federal activities.
    - ***Low publicity*:** Federal campaign activities only and no *significant* regional program sponsor activities.
    - **Other:** All other DMAs.

  Through this project, individual utilities or statewide organizations were offered the opportunity to survey an "oversample" in their service areas. The Vermont Department of Public Service took advantage of this offer in 2000. However, these data were not processed separately. Rather, they were included in the data set for the "High Publicity Areas."
- **2002 On-Site Survey of Vermont Homes Built Prior to 1999.** As part of the residential program evaluation effort, XENERGY undertook an on-site survey of a statewide sample of 71 homes built prior to 1999. The survey included a short self-administered questionnaire for the respondent that contained a number of items about recognition of the ENERGY STAR label and its use in appliance purchase decisions.

In the paragraphs below we assemble information from these sources to develop a historical view on the development of awareness and knowledge of energy-efficient appliances. Readers should keep in mind that there were differences in sampling approach, survey medium, and question wording among all three of the surveys reported here, and that these differences likely affected the survey results.

Recognition of the ENERGY STAR Label

Table 6- shows the results of items probing customer's recognition of the ENERGY STAR label. In 2001, 25 percent of the respondents to the CEE survey claimed to have seen the ENERGY STAR label without seeing a visual prompt; 38 percent in the high publicity areas. Only 13 percent of the respondents to the 1999 Vermont Appliance Baseline Survey reported that they were aware of the label. While the results presented in Table 6-13 cannot be used to assess the effect programs on Vermonters' recognition of ENERGY STAR, they do indicate that awareness of the ENERGY STAR label grew over the period under analysis here, particularly in areas with active efficient lighting and appliance promotion programs.

Table 6-13
Survey Results on Recognition of the ENERGY STAR Label

				Percent of Respondents Aware of Label		
Survey/Area Covered	**Survey Type**	**n =**	**Vis. or Verb. Prompt**	**1999**	**2001**	**2002**
Appliance Baseline Survey: **VT**	Phone	150	No	13%		
CEE Survey: **US**	Mail	00: 3,994 01: 1,995	Yes		41.0%	
CEE Survey: **High Publicity Areas**	Mail		Yes		54.0%	
CEE Survey: **US**	WebTV	Aid: 1,810 No Aid: 1,674	Yes No		39.0% 25.0%	
CEE Survey: **High Publicity Areas**	WebTV		Yes No		50.0% 38.0%	
On-site Survey: **VT**	Written	71				n/a

Influence of the ENERGY STAR label on appliance selection

The on-site survey and customer questionnaire contained items that, in combination, could be used to develop counts of appliances purchased in the past two years, the number that customers believed to be energy efficient, the number that had ENERGY STAR-qualifying model numbers, and the number of purchases influenced by the presence of the ENERGY STAR label. Survey respondents identified 14 or 28 percent of the 51 ENERGY STAR-covered appliances they purchased in the past two years as energy efficient. Forty percent of the respondents who reported purchasing appliances in the past two years said they had referred to the appliance label in assessing its energy efficiency. Only 12 percent (three respondents) mentioned the ENERGY STAR label specifically in this regard.

Participants in the nationwide ENERGY STAR survey reported a somewhat higher degree of label influence on appliance purchases. The CEE questionnaire contained items that elicited information on the appliances customers purchased in the twelve months prior to the survey, and on the influence of the ENERGY STAR label on model selection. In 2000, the question asked simply whether the presence of the label had influenced model selection. In 2001, the item was revised to elicit a characterization of the degree of interest (very much, somewhat, slightly, not at all). Among those who purchased ENERGY STAR-covered appliances in the 12 months prior to the survey, 50 percent reported that the label had influenced their purchases in 2000. The corresponding figure was 69 percent for the 2001 mail survey.

Sources of Information on Appliances and Energy Efficiency

Survey participants were asked where they obtained information about major purchases for their homes, energy conservation and energy efficiency in their homes. The range of sources that

customers identified, and the frequency with which they were mentioned suggest that the on-site respondents took a great deal of initiative to learn about the characteristics of available products.

Table 6-14
Sources of Information for Major Purchases, Energy Efficiency, and Renovation Work Among Survey Participants

n=71, multiple mentions allowed	Percent Mentioning in relation to:	
Information Source	**Major Purchases**	**Energy Efficiency**
Appliance Retailer	35%	7%
Internet	32%	35%
Consumer Reports/Digest	24%	6%
Friends / Family / Word Of Mouth	6%	7%
Utility Company	7%	23%
Yellow Pages / Telephone Book	-	3%
Appliance Specs	10%	-
Other Source	4%	10%
State Government	4%	4%
Printed Material	3%	8%
Contractor / Plumber	4%	4%
Efficiency Vermont	-	1%
Don't Know	8%	23%
Number of Respondents	71	71

As Table 6-14 shows, one-third of respondents reported referring to Internet sources to find out about general appliance characteristics and energy efficiency. An additional 24 percent reported referring to consumer reports. Ten percent even mentioned consulting appliance specifications. Only appliance dealers were mentioned as often as sources of product information (35 percent0. However, few respondents reported referring to appliance dealers for energy efficiency information. These results are consistent with those of similar items in the 2001 CEE ENERGY STAR survey. They reinforce the importance of the retailer as a source of information and highlight the emerging importance of Internet sources.

One other interesting result appears in Table 6-16. Twenty-three respondents mentioned that they had consulted their local utility company concerning energy efficiency, versus only one percent (one respondent) reporting contact with Efficiency Vermont for those purposes. Along the same lines, only 21 percent of the respondents mentioned being familiar at all with Efficiency Vermont. Given that the on-site respondents showed a higher-than-average interest in energy efficiency in other areas, such as purchase of efficient lighting equipment, the relatively low percentage familiar with Efficiency Vermont is a bit of a surprise. It may indicate that additional

consumer education and outreach is needed to establish the Efficiency Vermont brand. This is not surprising given the short time that EVT has been in operation, and the prior strong presence of at least some Vermont utilities in the efficiency arena.

6.3 THE SUPPLY SIDE OF THE MARKET

In this section we focus on characterizing baseline conditions and changes over the program period in key elements of the supply side of the market that most directly affect model selection. These are availability of qualifying models from manufacturers, the selection of models presented to customers on showroom floors, the pricing of ENERGY STAR compared to standard models, and the level and perceived effectiveness of retailer promotion of ENERGY STAR models.

6.3.1 Availability of Qualifying Models

Table 6-16 displays the number of models that met the ENERGY STAR specifications in effect during the years shown, as well as the number of brands under which these models appeared.[5] The ultimate sources for most of these figures are AHAM Product Directories.

Table 6-15
Availability of ENERGY STAR Qualifying Models
(Shaded cells represent changes in ENERGY STAR Specifications)

Appliance/	1998		1999		2000 (November)		2001 (April)		2002 (Oct)	
# models 2000	Models	Brands	Models	Brands	Models	Brands	Models	Brands	Models	Brands
Clothes Washers: 650	18	8	35	14	64	18	84	18	104	28
Dish-washers: 690	167	16	173	21	265	25	158	23	348	30
Refrigerators: 1800	331	19	171	13	301	14	58	10	402	18
Room AC: 800	87	32	65	23	32	8	40	8	206	25

The following trends are apparent from Table 6-.

- ***Clothes Washers.*** The number of models and brands of qualifying models has increased steadily and rapidly since 1998. At this point, roughly 16 percent of available models meet ENERGY STAR specifications. It is likely that the number of qualifying models will increase rapidly as the 2004 change in federal standards approaches.

[5] Several manufacturers make appliances for labeling by a number of brands. There are fewer manufacturers than brands.

- ***Dish Washers.*** The number of qualifying models increased rapidly between 1999 and 2000, then dropped off in 2001 with the introduction of new ENERGY STAR specifications. The number of available models more than doubled from April 2001 to October 2002.
- ***Refrigerators.*** ENERGY STAR refrigerator models were widely available in the years 1998 through 2000. At the time new ENERGY STAR specifications went into effect in January 2001, fewer than 40 models then in production qualified. With new federal standards taking effect in July 2001, manufacturers dropped hundreds of non-complying models from their catalogs. Between April 2001 and October 2002, manufacturers added 344 ENERGY STAR-qualified models to their catalogs. By the end of 2002, there were more models available that met the more stringent specifications that came into effect in January 2001 than there had been prior to the change in specifications.
- ***Room Air Conditioners.*** As was the case for dishwashers and refrigerators, the number of room air conditioner models that met ENERGY STAR standards increased significantly (more than 5-fold) between 2001 and 2002.

The relatively steady increase in the number and percentage of appliance models meeting ENERGY STAR specifications is consistent with broader appliance manufacturer premium product positioning strategy. Virtually all manufactures have adopted a stated strategy to bundle high energy efficiency with other product attributes for which customers are willing to pay extra: quiet operation; high capacity, advanced controls, and the latest in white goods fashion. From a revenue and profit standpoint, it is to the manufacturers' advantage to increase the market share for these premium products once the investments needed to manufacture them in quantity have been made.

6.3.2 Retail Channels

About 90 retail stores sell appliances products in Vermont. Almost all of these stores are participating in the current Efficiency Vermont appliance program. An analysis of the APT retailer database found that 73 percent of these stores could be classified as independents, 17 percent as national chain outlets, such as Sears, and 10 percent as regional chain outlets.

National sales data collected by TWICE magazine from their Major Appliance Retail Registry indicates that the majority of appliances purchased in the United States are purchased from mass merchants (such as Sears) and electronics/appliance stores (such as Circuit City and Best Buy), as shown in Table 6-16 below.

Table 6-16
Source of Major Appliance Purchases

	U. S. Major Appliance Sales 1999*		Vermont 2001
Store Type	**$ Million**	**% of Dollar Amounts**	**% of total CW unit Sales**
Department	$14.0	0.1%	2.0%
Electronics/Appliance	$4,921.7	39.4%	23.1%
Home furnishings	$496.1	4.0%	2.0%
Home improvement centers	$1,265.0	10.1%	6.2%
Mass merchants	$5,571.0	44.6%	49.6%
Other types	$62.8	0.5%	17.2%
Warehouse clubs	$160.0	1.3%	-
Total Registry	***$12,490***	100.0%	100.0%
Source: TWICE, November 20, 2000. Note: Information gathered from the TWICE 2000 Major Appliance Retail Registry, a composition of 100 retail chains.			

Analysis of the store-level clothes washer sales data collected by APT (see Section 6.2.2.) suggests that other types of outlets, such as electric supply stores, appliance service contractors, and gas and oil delivery companies account for a greater portion of appliance sales than the data from the Appliance Retail Registry would suggest. Furthermore, appliance sales in Vermont appear to be more concentrated in the mass merchandiser channel than in the country as a whole, especially for room air conditioners and dishwashers. This trend is clearly visible in Table 6-17, which shows a comparison between Vermont and the United States as a whole in the portion of AHAM-estimated distributor sales accounted for by the major retail chains that report to the DOE ENERGY Star appliance sales database.

Table 6-17
Percentage of AHAM-Estimated Distributor Sales
Accounted for by Chain Outlets in the DOE ENERGY STAR Appliance Database: 2001

Appliance	Total US	Vermont	Percent Difference Vermont/US
Room Air Conditioners	13.35%	43.5%	226%
Clothes Washers	36.98%	49.6%	34%
Dishwashers	21.95%	37.4%	70%
Refrigerators	29.39%	45.9%	56%

6.3.3 Appliance Stocking Practices

Data Sources

Types of data collected. As part of their tracking duties, Efficiency Vermont (EVT) program contractor Applied Proactive Technologies (APT) semi-annually collects data on the stocking and pricing practices of participating retail stores in Vermont. For appliances, this database contains regularly updated inventory records for roughly 50 retailers throughout the state – representing all sizes and categories of retail stores selling air conditioners, clothes washers, dishwashers, and refrigerators. The dataset is large enough and broad enough, in terms of geographic coverage and store types, that results should be fairly representative of retail stocking practices throughout the state.

The data set contains the model number, price, and ENERGY STAR designation of all units *on display* in each store. According to representatives of retailers and buying groups interviewed for this evaluation, the models on the display floor reflect quite closely the composition of models in warehouses. Thus, the percentage of ENERGY STAR models on display serves as a good index not only of what consumers see when they visit the store, but of the availability of various models.

In the more recent inventories, the annual electricity usage was recorded from the EnergyGuide label for clothes washers, dishwashers, and refrigerators as well as the listed EER for air conditioners. In addition, the inventories began recording the capacity for refrigerators and air conditioners as well as the type of refrigerator (Side-by-side, Top-freezer, or Bottom-freezer). Because this information was not consistently collected for all the inventories though, it was not utilized for this analysis. Instead, the analysis focuses on stocking levels and pricing trends.

Sample of stores. APT collected appliance inventory information from roughly 50 of the 91 retail locations that submitted clothes washer rebate programs in 2001. Table 6-18 displays the minimum and maximum number of stores in each category for which inventory data were available in the five semi-annual data sets that XENERGY received. Table 6-18 also shows the average number of appliances in each type of store, and the overall share of appliance models on display by store type.

Table 6-18
Stocking of Appliances by Store Type, 2001*

Store Type	Stores in Sample*	Average Number of Models on Display			
		CW	RE	DW	RAC
Appliance	20	11	16	11	5
Mass Merchants	8	27	36	18	8
Service Contr.	8	12	11	9	3
Electronics	4	18	28	18	11
Home Improve.	3	13	22	14	6
Electrical Supply	4	7	16	8	3
Oil/Gas Co.	4	5	7	5	-
Hardware	3	7	15	7	3
Furniture	2	23	16	6	4
Average All Stores	**55**	**13**	**19**	**11**	**5**

- All data from Fall 2001 inventory except for air conditioner data, which is from Spring 2001 inventory

Decision Making

Table 6-19 summarizes the primary decision-makers regarding appliance inventory, stocking, pricing and promotion at the sampled retail stores. The local store manager handles the majority of decisions surrounding each aspect of appliance sales, promotion, and pricing at independent stores. However, at larger chain stores, the appliance department manager or a committee of managers have more decision-making responsibilities.

Table 6-19
Primary Appliance Decision Makers

Decision Maker	Inventory Decisions	Stocking and Display Decisions	Pricing and Promotion Decisions
Local Appliance/Sales Manager	33%	17%	17%
Store Manager	41%	58%	42%
Committee of Managers	17%	25%	33%
Buying Group	8%	0%	8%
Manufacturer	0%	0%	0%
Number of Respondents	**12**	**12**	**12**

Clothes Washers

Table 6-20 presents the percentage of ENERGY STAR clothes washers on display by store for each semi-annual inventory, beginning in Fall 1999, 5 – 6 months before the inception of the EVT program. The key points to be observed are as follows.

- ***Baseline stocking levels and trends.*** For all stores in the sample, the percentage of ENERGY STAR models on display was high in the Fall 1999 inventory (22 percent) and rose steadily through the fall of 2001. Both the level of stocking and the trend over time match almost exactly the trend in market share for ENERGY STAR clothes washers.
- ***Comparison of chains to independents.*** Among appliance stores and other types of independent outlets, the portion of ENERGY Star models on display ranged from 31 to 37 percent in Fall 2001, versus 19 percent for Mass Merchants. This pattern carried through all of the inventories, and is consistent with the difference in ENERGY STAR share of unit sales between the two groups of retailers.

Table 6-20
Stocking of ENERGY STAR Clothes Washers by Store Type

Store Type	Percent ENERGY STAR				
	Fall 1999	Spring 2000	Fall 2000	Spring 2001	Fall 2001
Appliance	26%	27%	29%	29%	31%
Dept Stores	12%	12%	17%	19%	19%
Service Contractor	32%	33%	34%	39%	37%
Electronics	23%	20%	32%	26%	24%
'Other ' Store Types					
Home Improve.	25%	24%	26%	26%	36%
Electrical Supply	19%	23%	27%	32%	35%
Hardware	20%	19%	19%	22%	35%
Oil & Gas Co.	40%	44%	33%	46%	43%
Furniture	11%	24%	24%	20%	17%
All Stores	22%	22%	25%	28%	28%

Refrigerators

Table 6-21 presents the percentage of ENERGY STAR refrigerators on display by store for each semi-annual inventory, beginning in Fall 1999. The key points to be observed are as follows.

- ***Baseline stocking levels and trends.*** The average share of ENERGY Star models on display follows the time trends of model availability and market share discussed above. From 1999 through Fall 2000, the share of ENERGY STAR models on display rose from 21 to 30 percent. In the first inventory following the effective date for the new ENERGY STAR specifications, the share of qualifying models on display fell to eight percent. By the succeeding inventory in the Fall of 2001, the ENERGY STAR share had recovered to 20 percent.
- ***Comparison of chains to independents.*** The differences in stocking patterns between mass merchants and independent stores mirrored those in ENERGY STAR market share, and were exactly the reverse of the relationship found for clothes washers. Mass merchants consistently displayed a much higher percentage of qualifying models, for example 32 percent versus 11 percent for appliance stores in the Fall 2001 inventory. Electronics stores and home improvement centers, which were for the most part branches of national chains, also displayed a relatively high share of ENERGY STAR models.

Table 6-21
Stocking of ENERGY STAR Refrigerators by Store Type

Store Type	Percent ENERGY STAR				
	Fall 1999	Spring 2000	Fall 2000	Spring 2001	Fall 2001
Appliance	14%	16%	23%	6%	11%
Mass Merchants	31%	36%	45%	15%	32%
Service Contractor	20%	17%	27%	9%	18%
Electronics	16%	14%	26%	4%	21%
'Other ' Store Types					
Home Improvement	14%	21%	21%	11%	22%
Electrical Supply	13%	14%	17%	0%	8%
Hardware	31%	22%	19%	3%	17%
Oil & Gas Company	13%	22%	25%	4%	22%
Furniture	33%	22%	21%	0%	0%
All Stores	21%	22%	30%	8%	20%

Dishwashers

Table 6-22 presents the percentage of ENERGY STAR dishwashers on display by store for each semi-annual inventory, beginning in Fall 1999. The key points to be observed are as follows.

- ***Baseline stocking levels and trends.*** The average share of ENERGY Star models on display follows the time trends of model availability and market share discussed above. From 1999 through Fall 2000, the share of ENERGY STAR models on display rose from 31 to 41 percent. In the first inventory following the effective date for the new ENERGY STAR specifications, the share of qualifying models on display decreased to 31 percent. By the Fall of 2001, the ENERGY STAR share of dishwashers had reached the its peak level from the period prior to the change in specifications.

  This pattern is similar to that seen for refrigerators, although by no means as extreme. This is likely due to the relatively small change in efficiency standards for dishwashers and to the mismatch in the timing of the effective dates between the federal standards and ENERGY Star specifications for refrigerators.

Table 6-22
Stocking of ENERGY STAR Dishwashers by Store Type

Store Type	Percent ENERGY STAR				
	Fall 1999	Spring 2000	Fall 2000	Spring 2001	Fall 2001
Appliance	36%	44%	49%	37%	43%
Mass Merchants	13%	13%	23%	17%	28%
Service Contractor	34%	38%	51%	48%	49%
Electronics	42%	21%	52%	39%	46%
'Other ' Store Types					
Home Improvement	27%	31%	32%	34%	37%
Electrical Supply	64%	41%	62%	45%	53%
Hardware	43%	39%	29%	10%	25%
Oil & Gas Company	38%	21%	63%	67%	74%
Furniture	13%	15%	27%	18%	33%
All Stores	31%	33%	41%	34%	41%

- ***Comparison of chains to independents.*** The differences in stocking patterns between mass merchants and independent stores mirrored those in ENERGY STAR market share. Appliance stores and other independents consistently displayed a much higher percentage of qualifying models versus the mass merchants. However, the difference between the

two appears to have narrowed over time. For example, in the Fall 2000 inventory, the percentage of ENERGY STAR models on display in appliance stores was 49 percent versus 23 percent for mass merchants. By the Fall 2001 inventory, this difference had narrowed to 43 percent v. 28 percent.

Room Air Conditioners

EnergyStar Air Conditioners. Table 6-23 shows the percentage of ENERGY STAR room air conditioners on display by store type for the Spring 2000 and Spring 2001 inventories. Retailers generally stock room air conditioners only during the spring and summer months. The results summarized in the table reflect the reduced number of models available due to the change in standards. They also reflect the higher share of ENERGY STAR unit sales observed for mass merchants versus independents. The pattern of differences between channels is less clear cut for room air conditioners than it was for the other appliances.

Table 6-23
Stocking of EnergyStar Room Air Conditioners by Store Type

Store Type	Percent ENERGY STAR	
	Spring 2000	Spring 2001
Appliance	20%	3%
Mass Merchants	20%	14%
Electronics	38%	3%
Service Contractor	23%	0%
Home Improvement	33%	6%
'Other ' Store Types		
Electrical Supply	17%	20%
Furniture	20%	0%
Hardware	0%	0%
Oil & Gas Company	29%	-
All Stores	23%	7%

Explanation of Differences in Stocking between Chains and Independents

The difference in stocking patterns between chains and independents is important because it appears to be related to differences in the share of ENERGY STAR appliances stocked by the two sets of retailers. Understanding the motivations for the apparent difference in retailing

approaches between the two groups may provide some guidance in fashioning effective program strategies. To develop information on this point, XENERGY approached a number of individuals with the market share and stocking findings discussed above. These included the program manager for EVT, the program manager for APT, and product managers at a number of appliance manufacturers. The key factor identified by all observers of appliance retailing, is that the chain stores make best use of their size and buying power by attempting to sell to the broad middle of the market. Effectively, this means displaying a large number of units that cover as many price/feature/efficiency combinations as they can, while avoiding very high and very low end products. Independents serve a smaller area and have limited display space. They therefore display (and sell) models that they believe will appeal to their customers, who generally inhabit narrower economic niche (high or low) than chain store customers.

The practical implications of these strategies work out differently for different kinds of appliances.

- ***Refrigerators.*** Refrigerators differ from dishwashers and clothes washers in that there are feature-laden, expensive models that do not qualify for the ENERGY STAR label. In fact, some very high-end features, such as cabinet depth design, use of two compressors, ice and water dispensers make it very difficult for models to meet ENERGY STAR specifications. Thus, retailers who serve very high-end markets may not push ENERGY STAR models, especially since the relatively modest savings available may be outweighed in their customers' minds by preferences for other features. Similarly, independents serving lower income areas will cover much lower-end models, which also do not meet ENERGY STAR standards. Chain stores have more space to stock ENERGY STAR models and do not run the risk of losing sales by doing so.
- ***Dishwashers.*** Virtually all high-end dishwashers currently on the market qualify for the ENERGY STAR label. Moreover, dishwashers remain something of a premium product in Vermont and in the U. S. as a whole. Only 54 percent of the customers in the on-site sample had dishwashers installed. Independent retailers serving low-income areas will carry only a few models of dishwashers since they do not sell many units. Independents in more affluent areas will stock higher-end models, virtually all of which qualify for ENERGY STAR.
- ***Clothes washers.*** Both product managers and the APT program manager reported that manufacturers have offered incentives to dealers to sell ENERGY STAR clothes washers. As discussed above, these products command a high price premium and are very profitable for manufacturers on a unit basis once product development and line set-up costs are amortized. Generally, appliance sales personnel in large chain stores cannot personally accept incentives from manufacturers. Proprietors of independent stores who also serve as the sales staff can do so more easily. Thus, independents may have a stronger incentive to sell ENERGY STAR clothes washers.

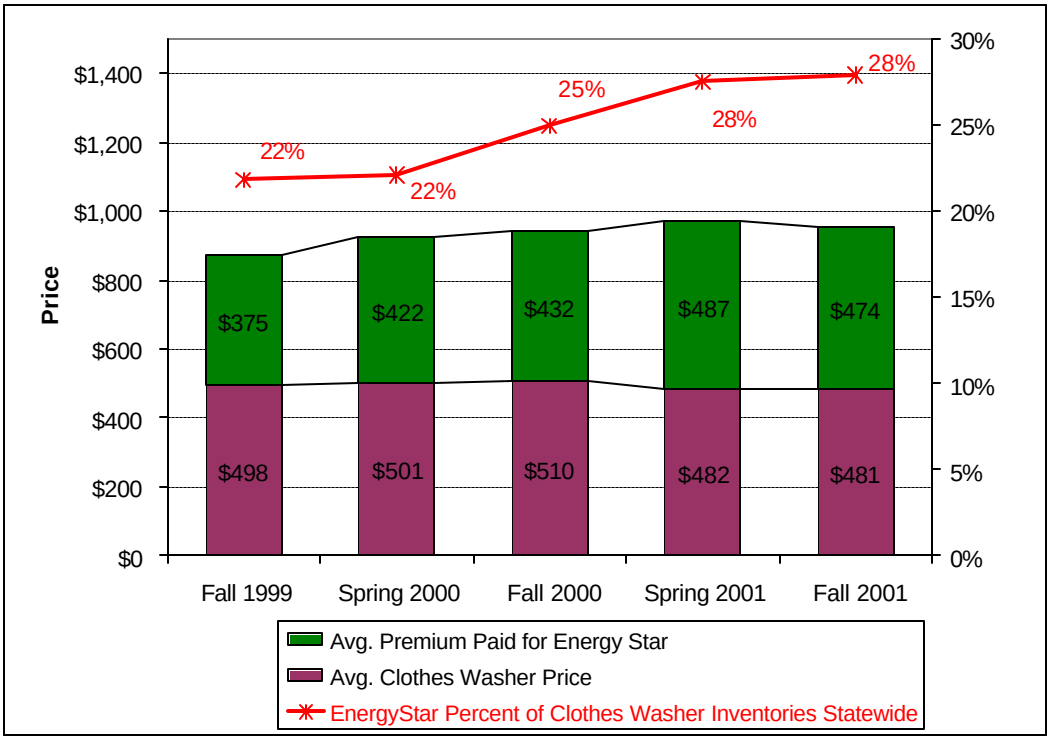
6.3.4 Pricing Trends

As part of their stocking inventory, APT also collects price information on the appliance models. More recent inventories also include information on model capacity for refrigerators and air conditioners. However, within categories established by size, configuration, and ENERGY STAR qualification, prices vary by $200 to $600. The dataset does not contain information on appliance features, controls, or other product attributes that would be necessary for a comprehensive analysis of pricing. Therefore, to take best advantage of the information available over time, we have elected to analyze and display the average prices for ENERGY STAR and standard efficiency models by appliance type and year.

Clothes Washers

Figure 6-1 tracks the average price sought for standard clothes washers, the average price sought for ENERGY STAR models, the difference between those two averages, and the percent of clothes washer stock that qualified for the ENERGY STAR label. Over the period from Fall 1999 through Fall 2001, the price of standard washing machines changed less than 4 percent from one period to the next around an average of $500. However, the average incremental cost for ENERGY STAR models increased from $375 in Fall 1999 to $474 in Fall 2001. This trend is somewhat surprising in light of the introduction of an increasing number of less expensive, vertical axis models that meet the ENERGY STAR specifications.

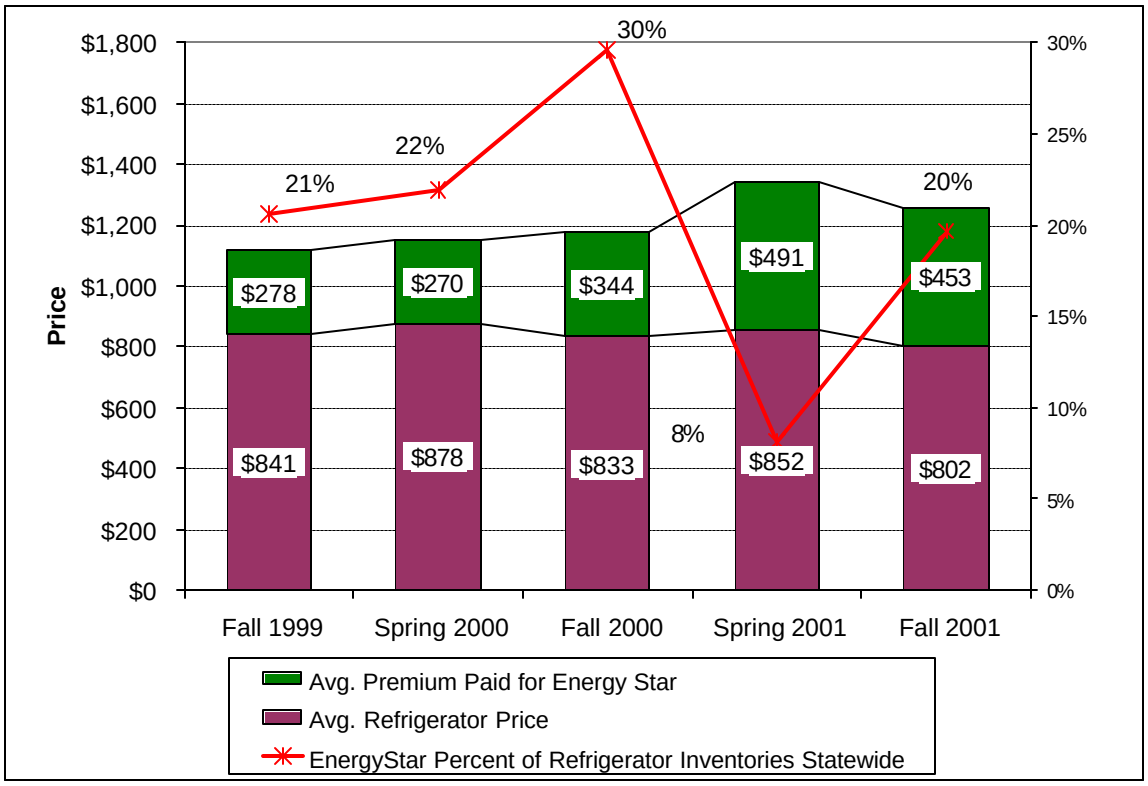
Figure 6-1
Clothes Washer Price and Stocking Trends



Refrigerators

Figure 6-2 tracks the average price sought for standard refrigerators, the average price sought for ENERGY STAR models, the difference between those two averages, and the percent of clothes washer stock that qualified for the ENERGY STAR label. The difference in average prices between standard and ENERGY STAR models rose from $278 in 1999 to $453 in 2001. As discussed above, new ENERGY STAR specifications went into effect in January 2001 followed by new federal minimum standards in July 2001. Prior to that, federal standards had remained unchanged for eight years, manufacturers had built up a large stock of models that were 20 percent more efficient than the federal standard, and the price premium for these models had narrowed to $270. The difference in average prices for standard and ENERGY STAR models reached $491 in the first quarter after the introduction of the new specifications. The price difference moderated to $453 in the Fall 2001 inventory. This trend is consistent with the significant increase in the number of qualifying models available between April 2001 and October 2002.

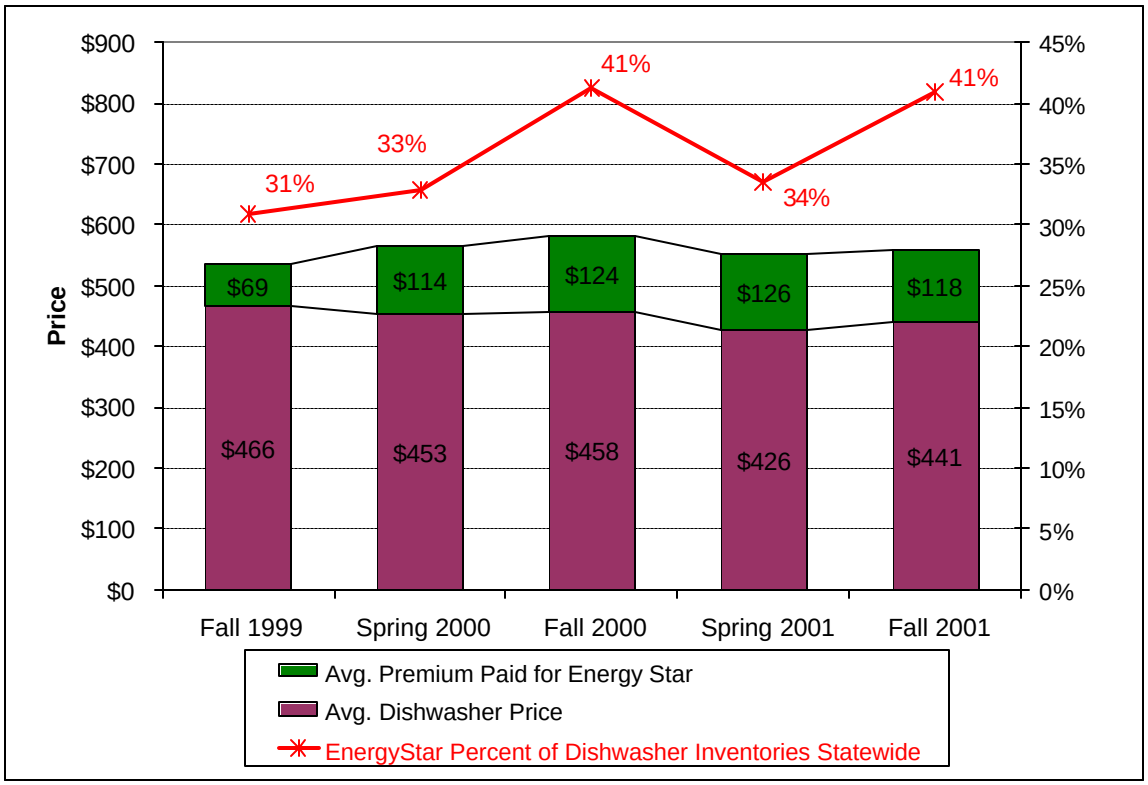
Figure 6-2
Refrigerator Price and Stocking Trends



Dishwashers

Dishwashers. Figure 6-3 tracks the average price sought for standard dishwashers, the average price sought for ENERGY STAR models, the difference between those two averages, and the percent of clothes washer stock that qualified for the ENERGY STAR label. The difference in average prices between standard and ENERGY STAR models rose from $69in 1999 to $124 in the Fall of 2000. As discussed above, new ENERGY STAR specifications went into effect in January 2001. The difference in average prices for standard and ENERGY STAR models reached $126 in the first quarter after the introduction of the new specifications. The price difference moderated to $453 in the Fall 2001 inventory. Between the Fall 2000 and Spring 2001 inventories, prices for standard and ENERGY STAR models fell by around 5 percent. The difference in average prices between standard and ENERGY STAR models remained very stable over the four semiannual inventories beginning in Spring 2000.

Figure 6-3
Dishwasher Price and Stocking Trends



Air Conditioners

In Spring 2000, the EnergyStar air condition were on average $17 (or 5%) cheaper than the ordinary models. However, in Spring 2001 the EnergyStar models cost slightly more (about

10%). Prices for all air conditioners declined sharply between 2000 and 2001. The average price for standard models decreased from $357 to $286; for ENERGY STAR models from $340 to $313.

6.3.5 Retailer Knowledge and Attitudes towards ENERGY STAR Appliances

XENERGY conducted interviews with representatives of 12 appliance retailers who participated in the EPP. The sample was designed to be representative of different areas of the state and of the various kinds of participating stores. Outlets in the sample included seven independent appliance retailers, two small chain appliance stores, two Sears locations, and one large home center. The objectives of the interviews were to develop information on:

- The locus of decision making in regard to inventory purchase, promotion, and display;
- Retailers' perception of trends in the market share of ENERGY STAR appliances and reasons for those trends;
- Perceptions of the consumer advantages and disadvantages of ENERGY STAR appliances; and,
- The importance of stocking and promotion of ENERGY STAR appliances to the overall success of their businesses.

The 1999 *Baseline Study* included interviews with a sample of 54 dealers that covered many of the same sets of issues. Where appropriate, we compare the findings from the 1999 interviews to those conducted for the current evaluation.

Retailer Perception of Sales Trends

Table 6-25 displays the perceptions among the retailers of ENERGY STAR appliances sales trends. For each of the four appliances, the large majority of dealers perceive that the share of ENERGY STAR sales increased over the year prior to the interviews. There was no notable difference among the different stores in the sample in the pattern of response.

Table 6-25
Retailer Perceptions of Energy Star Appliance Sales Trends

Perceived Sales Trend	Refrigerator	Clothes Washer	Dishwasher	Room Air Conditioner
Increased	83%	75%	83%	67%
Stayed the Same	8%	0%	0%	8%
Decreased	8%	25%	17%	25%
Number of Respondents	12	12	12	12

Survey respondents attributed the increased sales of Energy Star-qualified appliances to the following factors:

- Increased customer awareness of Energy Star product (from Internet and advertising)

- Availability of more Energy Star models from a range of manufacturers
- Customers have indicated a willingness to pay extra for ENERGY STAR-qualified products
- Incremental price of ENERGY STAR products equal long run savings
- Popularity of energy efficient product features (e.g. front-loading clothes washers; bottom freezer feature on some energy efficient refrigerator models)
- Incentives and quality of "ENERGY STAR Rated Homes" (drives sales up during new construction and remodeling)

> "Most Customers do their homework. With the availability of information on the Internet on energy efficient products, it is up to the sales people at stores to help customers sort out and compare all of the information out there"
>
> --Retail Store Manager,
> National Chain

None of the respondents mentioned the EPP program (unprompted) as a key reason for the increased market share of ENERGY STAR.

Retailer Perceptions of Consumer Advantages of ENERGY STAR Products

Store managers were asked about their understanding of customer perceptions regarding energy efficient appliances.

Advantages. Based on in-store conversations with customers regarding appliances, the store managers were asked to list the key advantages that customers recognize about ENERGY STAR-qualified appliances. As Table 6-24 indicates, the majority of retailers (83 percent) cited energy savings as the key advantage and 58 percent mentioned a similar benefit, lower operating costs.

However, three separate retailers from independent stores specifically mentioned that their customers, who are not serviced by a city water supply, look at water use efficiency in ENERGY STAR-qualified dishwashers and clothes washers since their well water reserves are not guaranteed. Thus water efficiency may present another valuable feature of energy efficient appliances, especially in rural areas.

Table 6-24
Key Advantages of Energy Star Appliances*

Advantage	Chain Store	Independent Store	Overall
Energy Savings	100%	78%	83%
Lower Operating Costs	33%	67%	58%
Environmentally friendly	33%	44%	42%
Water efficiency	0%	33%	25%
Better performance	100%	0%	25%
Less wear and tear[6]	100%	0%	25%
Product features better than standard efficiency appliance	0%	11%	8%
Number of Respondents	3	9	12

* Multiple response question, percentages may not sum to 100%.

Among dealers interviewed in 1999, a much lower percentage mentioned consumer product advantages other than energy savings. None mentioned environmental impacts, and only five percent mentioned better performance or less wear and tear on clothes.

Disadvantages. Almost every respondent cited higher prices as the primary disadvantage or negative feature of ENERGY STAR appliances. Few other disadvantages were cited by respondents. Among dealers interviewed in 1999, a higher percentage mentioned disadvantages such as poorer quality (dishwashers – 20 percent), and expensive repairs (10 – 14 percent, depending on the appliance). Overall, then, it appears that retailers' opinion of the consumer benefits of ENERGY STAR appliances strengthened over the EVT program period, although the small sample limits the extent to which we can generalize that finding.

Relative Value of Appliance Features. The store managers were probed regarding the relative value of energy cost savings versus premium features in a customer's decision to purchase an ENERGY STAR-qualified appliance. All three chain retailers indicated that the energy savings were most important to their customers who were interested in ENERGY STAR appliances. However, the split was fairly even among independent retailers - five indicated cost savings were more important to their customers and four indicated that premium features were more important. In general, managers thought that energy savings was a more important factor than premium features in the purchase of

> "Appliance sales people have the job of sorting out customers' perception versus reality [about Energy Star appliances]. People hold on to the thinking that if a dishwasher uses less water, their dishes won't be as clean as if they had used a standard dishwasher. Our job is to give people facts and information so they can make a more informed decision."
>
> Sales Manager, independent store

[6] Respondent was referring to customer feedback regarding clothes washers and dishwashers specifically.

refrigerators and, particularly, clothes washers, than for other appliances.

Retailer Perceptions of Barriers and Business Advantages of Promoting ENERGY STAR Appliances

Barriers. Three-quarters of the retailers interviewed said they did not believe that there were any barriers to further stocking and display of Energy Star-qualified models (Table 6-25). Two respondents pointed out that a finite amount of showroom space constrains the number of models that can be stocked.

Table 6-25
Retailer Barriers to Further Stocking & Promotion of Energy Star Appliances

Response	Chain Store	Independent Store	Overall
No Barriers	67%	78%	75%
Limited space to display more items	33%	11%	17%
Change in Energy Star standards creates confusion	0%	11%	8%
Number of Respondents	3	9	12

Benefits. When asked to cite the benefits of stocking and promoting Energy Star appliances, nearly half of the retailers believed that Energy Star products are key to bringing customers into their store, instead of other stores that do not carry ENERGY STAR products (Table 6-26). Over one-quarter of respondents mentioned that Energy Star sales information helps close sales and 18% cited the benefit of a "diverse product range".

As one appliance sales manager indicated when interviewed, *"More people are looking for ENERGY STAR than ever before…the name is out there and people are looking for it."*

Table 6-26
Store Benefits Associated with Further Energy Star Appliance Stocking and Promotion

Response	Chain Store	Independent Store	Overall
Energy Star name recognition is key to bringing customer into the store	33%	50%	45%
Sales information on Energy Star helps close sales	33%	25%	27%
Contributes to diverse product range	33%	25%	18%
Number of Respondents	3	8	11

Importance Rating. XENERGY asked retailers to rate the importance of stocking and promoting ENERGY STAR appliances to the overall business goals of their stores. On a ten-point scale (where 1 is very unimportant and 10 is very important), two retailers rated Energy Star-qualified appliances a 'ten' in relation to their store's business goals (Table 6-27). Six of the nine independent retailers surveyed rated Energy Star appliances either an 'eight' or a 'nine'. One chain store manager rated Energy Star appliances only a 'four' with regard to his store's overall business goals.[7] Overall, there appears to be little difference between chain store and independent stores in regard to the value place on energy efficient appliances. These findings are consistent with manufacturers' product positioning strategies, that generally bundle efficiency with other desirable features in higher-end models. However, it stands in strong contrast to the opinions of retailers who participated in the lighting component of EPP. These retailers reported that stocking and promotion of efficient lighting products had little effect on their overall business objectives. For most of these retailers, lighting accounted for a relatively small percentage of total sales revenue.

> "If you don't have [Energy Star-qualified appliances] you'll lose business. Because of the Internet, people know their appliances."
>
> Appliance Department Manager, Chain store

Table 6-27
Rating the Importance of ENERGY STAR Appliances to Business Goals

Rating	Chain Stores	Independent Stores	Overall
1 – Not at all Important	0%	0%	0%
4	33%	0%	8%
7	33%	22%	25%
8	0%	44%	33%
9	0%	22%	17%
10 – Very Important	33%	11%	17%
Average Rating	7.0	8.2	7.9
Number of Respondents	3	9	12

Respondents cited a variety of reasons for believing that EnergyStar appliances are important to the success of their store. Some mentioned higher customer demand for these products, others mentioned that these products "bring in" customers to the store, while others cited the benefits of having a diverse range of products.

[7] This respondent also indicated that sales overall of Energy Star appliances have remained about the same since last year on products across the board.

6.4 INTEGRATED ANALYSIS

In this section we assemble findings from the previous discussions of baseline conditions and market changes in an attempt to develop an integrated view of the workings of the appliance market, development of the market for ENERGY STAR appliances, and the role of the EPP in that development. We begin with an examination of changes in the markets for the four ENERGY STAR appliances over the period 1999 through 2001, with particular attention to the relationship between model availability, stocking patterns, and ENERGY STAR market share. We then move on to a cross-sectional analysis of the effects on market share of incentive and promotion programs by state and year. From this analysis we derive estimates of the net effect of the EPP on the ENERGY STAR market share for the four appliances in Vermont.

6.4.1 Operation of the Appliance Market over Time

Table 6-28 displays information on model availability, stocking practices of Vermont retailers, ENERGY STAR market share in Vermont, and the national ENERGY STAR market share for appliances sold through chain establishments that report to the DOE market share tracking system. The table presents this information for clothes washers, dishwashers, and refrigerators. We elected to omit room air conditioners from this analysis due to the recent volatility in model availability, stocking, and pricing for those appliances. Review of the information in Table 6- suggests the following conclusions about the markets for the covered appliances.

The markets for clothes washers, dishwashers, and refrigerators need to be analyzed separately. These three items are manufactured by the same set of companies and reach the consumer through similar supply chains. However, based on information discussed above, the resemblance between them ends there. From the consumer viewpoint, the economic benefits of upgrading to an ENERGY STAR model differ significantly by appliance. For clothes washers, the energy savings are fairly substantial (about $73 per year in Vermont), whereas they are fairly negligible for dishwashers and refrigerators. ENERGY STAR dishwashers and clothes washers offer the additional value of water savings, which can be of particular importance to rural customers without municipal water service.

On the supply side, federal and ENERGY STAR standards changed at different times and degrees for the three appliances, and that pattern will continue. Different segments of the retailer channel appear to take different approaches to stocking and selling ENERGY STAR models of the various appliances. Independent retailers stocked and sold significantly higher percentages of ENERGY STAR clothes washers and dishwashers than chain outlets. This relationship was reversed for refrigerators and room air conditioners. Moreover, this pattern was identified by studies in California. This last finding indicates that national chains may face different incentives and opportunities in purchasing ENERGY STAR appliances from those faced by independents. Alternatively (or additionally), chain retailers may perceive that they serve a different customer profile from those served by independents. We were not able in this phase of the evaluation to characterize in detail the differences in operation and marketing strategies among the different

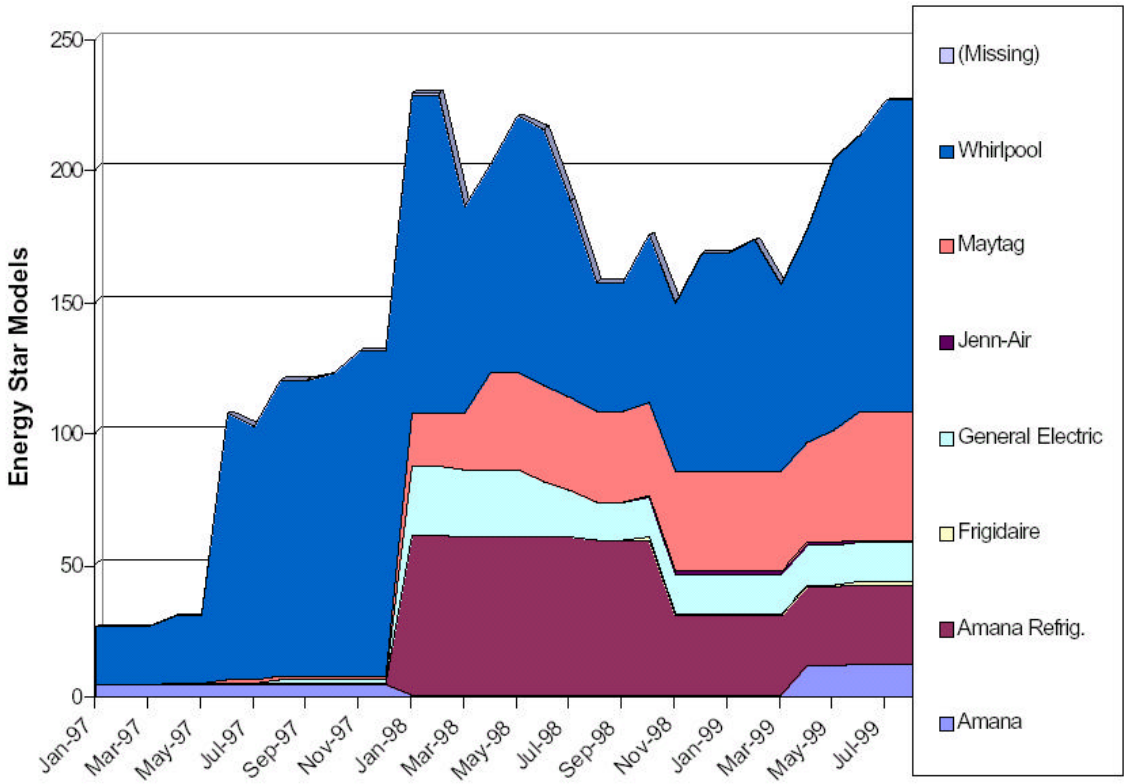
Table 6-28
Overview of Key Market Indicators Appliance and Year

	1999	2000	2001
CLOTHES WASHERS			
Number of ENERGY STAR Models Available	35	64	84
Vermont ENERGY STAR Percent Models Displayed*			
Chain	12%	17%	19%
Independent	26%	29%	31%
All Stores in Sample	22%	25%	28%
Vermont ENERGY STAR Market Share			
Chain	14.5%	22.6%	22.6%
Independent	28.0%	31.0%	37.0%
Weighted Average	26.3%	27.3%	32.3%
US Market Share (Chains)	8.5%	9.3%	10.3%
REFRIGERATORS			
Number of ENERGY STAR Models Available	331	301	58
Vermont ENERGY STAR Percent Models Displayed			
Chain	31%	45%	32%
Independent	14%	23%	11%
All Stores in Sample	21%	30%	20%
Vermont ENERGY STAR Market Share			
Chain	28.1%	31.0%	14.9%
Independent	12.0%	13.0%	8.0%
Weighted Average	19.4%	21.2%	11.2%
US Market Share (Chains)	24.4%	27.0%	17.3%
DISHWASHERS			
Number of ENERGY STAR Models Available	173	265	158
Vermont ENERGY STAR Percent Models Displayed			
Chain	13%	23%	28%
Independent	36%	49%	43%
All Stores in Sample	31%	41%	41%
Vermont ENERGY STAR Market Share			
Chain	7.5%	8.1%	14.8%
Independent	51.0%	58.0%	64.0%
Weighted Average	34.7%	39.4%	45.6%
US Market Share (Chains)	12.4%	10.9%	19.9%

channels that led to this result. The issue deserves further attention in subsequent research because it may offer guidance in developing effective program strategies.

Product availability was extremely volatile during the baseline and early program periods. Whereas the number of ENERGY STAR-qualified clothes washer models increased regularly over the period 1999 – 2001 (and into 2002), the number of qualifying refrigerators, dishwashers, and room air conditioners fluctuated widely during the period. This was due, in part, to the introduction of new ENERGY STAR specifications and changes in the federal standards for refrigerators. In many cases, shorter-term variations in model availability were even greater than the year-to-year changes. Figure 6-4 shows the number of ENERGY STAR refrigerator models appearing in the sales figures reported to the Department of Energy from January 1997 through August 1999. ENERGY STAR specifications became effective in January 1998. Although there were no changes in ENERGY STAR specifications between January 1998 and August 1999, the number of qualifying models fell 35 percent from January to November 1998 before returning to its earlier level in August 1999.

Figure 6-4
Number of ENERGY STAR Refrigerators Available
January 1997 – August 1999[8]



[8] From D&R International, Ltd. (1999). *Energy Star Appliances: 1998 Sales Data Report.*

Retailers exercise a great deal of discretion over stocking and promotion. As discussed in Section 6.3.4, virtually all appliance store and appliance department managers interviewed reported that they made inventory purchase, display, and pricing/promotion decisions locally. This self-report is consistent with the findings summarized in Table 6-30. The percentage of ENERGY STAR models stocked varies much less from year to year than do the number of models available or ENERGY STAR market share. To some extent, this relative stability reflects the physical limitations of showroom floors and the need to display a range of models. However, it is interesting to note that the number of ENERGY STAR dishwasher models available fell by over 40 percent between 2000 and 2001, but that the percentage of ENERGY STAR models on Vermont showroom floors remained stable at 41 percent. Similarly, despite the steep rise in the number of ENERGY STAR washing machine models available, the percentage of ENERGY STAR models displayed remained below 20 percent in 2001. These results suggest that retailers have definite ENERGY STAR marketing strategies in mind and pursue them through their purchasing practices unless, as in the case of refrigerators in 2001, availability radically changes in the course of a year.

Customers buy what they see. With the exception of dishwashers purchased from chain stores, the percentage of ENERGY STAR products sold tracks the percentage of models displayed quite closely. In combination with the findings concerning dealer stocking practices, it becomes clear that maintaining and growing the current level of retailer commitment to stocking and promoting ENERGY STAR appliances will be the key factor in the success of the program.

6.4.2 Assessment of Net Program Effect on ENERGY STAR Appliance Purchases

Basic Approach

To assess the net effect of the EPP on the market share ENERGY STAR appliances in Vermont, XENERGY estimated regression model of market share of an ENERGY STAR appliance in state *s* for each appliance and year for which complete state-by-state market share information was available from the DOE tracking system. The form of the model was:

$$MS_{ays} = a + b1ED_s + b2MI_s + b3PR$$

where:

MSays = the ENERGY STAR market share of appliance *a* in state *s* in year *y* as measured for chain outlets reporting to the DOE tracking system.

ED_s = the percentage of persons over 25 with a bachelor's degree or further educational attainment, as estimated by the 2000 United States Census.

MI_s = the median income of households in the state, as estimated by the 2000 United States Census.

PR = an indicator variable that took the value 1 if the there had been active utility or regional incentive programs available to most consumers in the state for at least 2 years during the period from 1999 to 2001. The sources

for this characterization were ENERGY STAR appliance program overviews available from the Consortium for Energy Efficiency (CEE), the Northeast Energy Efficiency Partnerships (NEEP), the Northwest Energy Efficiency Alliance, and the ENERGY STAR partner web site.

In developing the model we also examined the effect of including other variables that other studies have identified as being associated with adoption of energy efficient products. These included:

- the price of electricity, as measured by the average revenue per kWh sales to residential customers in the state (Energy Information Administration);
- the percentage of the population in the age group 45 – 54 (U. S. Census), a group that is typically overrepresented among participants in energy efficiency programs; and,
- the presence of utility or state agency programs that promote ENERGY STAR appliances without providing incentives.

None of these variables entered the model with significant coefficients, and none contributed significantly to the ability of the model to explain state-to-state variation in ENERGY STAR market share.

We estimated the model for each appliance in each year 1999 – 2001 for which complete data were available ENERGY STAR market share. Complete data were available for all years and appliances except room air conditioners in 1999. We then took the following steps to generate estimates of the net effect of the Vermont EPP on ENERGY STAR market share for each appliance and year.

1. Examine the model results to assess its suitability for estimating ENERGY STAR market share. This involved examining the sign and statistical significance of the coefficients and the portion of total variation in ENERGY STAR market share that the model accounted for (R^2). The model was accepted for further use in the analysis if the coefficients were statistically significant at the 10 percent probability level and had the expected signs, and if the *F* statistic for the model exceeded the critical value. This latter condition means that the observed relationship between the variables is very unlikely to have occurred by chance. In some cases, applying these criteria led us to drop either the income or education variables when they entered the equation with insignificant coefficients. For some years and appliances, the model did not meet the criteria for use in further analyses. There seems to be little discernible pattern to interstate differences in ENERGY STAR market share for refrigerators, and the model yielded no acceptable results for any of the years. The dishwasher model for 1999 also did not meet the criteria for use in further analysis.
2. Apply the model results to estimate Vermont's ENERGY STAR market share with and without the presence of the program. This involved enumerating the model with

Vermont's demographic variables with the indicator variable for the presence of the program set at 1, then at 0.

3. Compare the estimated ENERGY STAR market share to the actual share for Vermont. If the estimate and the actual were within a few percentage points of each other, we concluded that the model was a reasonable representation of the Vermont market for that year. This was the case for all of the appliances except clothes washers. For that appliance, actual ENERGY STAR market share in Vermont significantly exceeded the model estimate.
4. Estimate the net effect of the program on market share of ENERGY STAR models sold by retailers reporting to DOE as the difference between the actual market share and the estimated share with the program indicator variable set to 0. We present this result with a 90 percent confidence interval based on the standard error of Y (the ENERGY STAR market share variable).
5. Adjust the net program effect on market share to account for differences in Vermont between the chain retailers represented in the DOE database and independents in the percentage of ENERGY STAR appliances sold, by appliance type and year. This was accomplished by multiplying the difference between observed market share in chain outlets and the model estimate with the program variable set to zero by the ratio of chain store market chair to the weighted average share for chains and independents. This final step was not possible for 2002 because we did not have AHAM shipment data or information on ENERGY STAR model sales from independent retailers in Vermont.

Limitations on Interpretation

The following caveats must be kept in mind in interpreting the results of the modeling effort.

- ***Market coverage of the DOE market share estimates.*** As discussed above, the DOE ENERGY STAR market share tracking system collects information only from national chains, and only one of the reporting companies – Sears – has locations in Vermont. Moreover, there is strong evidence that the market share of appliances sold by independents differs from that of the chains, and this pattern is not consistent across different appliances. Thus, the DOE data series is at best an imperfect measure of market share. However, we do not have the means to adjust market share estimates in other states (except California) for differences between different kinds of outlets. The DOE data have the virtue of continuity, state-by-state disaggregation, and consistent data collection methods. To account for the differences between store types in ENERGY STAR market share in Vermont, we make an adjustment to the model results after estimating net program effects. This is clearly a "work-around", but we believe it is justified based on the strength of the evidence of differences between store types and the estimated size of those differences.
- ***Uniformity of programs.*** The model contains an implicit assumption that the appliance incentive promotions in the various states are uniform in terms of design, incentives,

portion of the state in which program is available, and so forth. This is pretty much the case for the states that hosted NEEP-designed programs, although, for example, program coverage in New Hampshire was limited to a few small utilities. Other states such as California, Oregon, and Washington had differing incentive structures, as well as timing of implementation. The model contains a further assumption that consumers in the various states are likely to respond to the programs in a similar fashion. The check of the model estimates versus actual market share provides a check on the reasonableness of the estimates, but does not constitute a formal demonstration that the implicit assumptions hold.

- ***Variables omitted.*** Of course there are many other factors that affect ENERGY STAR appliance market share, including model availability, differences in supply chains between states, and the list goes on. It would be difficult if not impossible to find quantitative measures to represent these differences. Nonetheless, our relatively simple model did a good job in accounting for inter-state variation in market share. R^2's ranged from .156 for the refrigerator 2001 model to .668 and above for the clothes washer models. Moreover, the t-statistics for the coefficients were consistently high.

For a complete description of model results, see Appendix C.

Summary Results of the Net Effects Analysis

Table 6-29 summarizes the results of the modeling effort described above. The following paragraphs explain these results and provide our recommended estimates of net program effects on ENERGY STAR appliance market share.

Clothes washers. The clothes washer model explained a significantly greater portion of state-to-state variation in ENERGY STAR market share than the models for the other appliances. This was expected since, with a few small exceptions, the appliance programs paid financial incentives only for clothes washers. For 1999 and 2001, the model estimate of chain store market share was quite close to the actual figure: 15.2 percent v. 14.5 percent in 1999; 20.1 percent v. 22.6 percent in 2001. For those two years, we concluded that the difference between the observed ENERGY STAR market share and the model estimate without the program was a fair representation of the net effects of the program.

In 2000, the model estimate was significantly below the observed figure, 16.5 percent v. 22.6 percent, a difference of nearly 30 percent. We nonetheless concluded that the difference between the observed level and the model estimate without the program was a fair estimate of net program impacts in 2000. The main factor we considered in making this judgment was that Vermont consumers had not purchased other ENERGY STAR appliances that offer fewer economic advantages in greater proportion than consumers nationwide. The ENERGY STAR share for dishwashers in Vermont had lagged consistently behind the national average. Vermont's share of ENERGY STAR refrigerators was slightly higher than the national average in 1999 and 2000, but lower in 2001. This could reflect the decrease in the benefit-cost ratio that accompanied the changeover in ENERGY STAR specifications as well as the shortage of qualifying models.

Table 6-29
Summary of ENERGY STAR Appliance Market Share Modeling Results

Appliance/Year	Model R^2	ENERGY STAR Market Share in Vermont Chains					Estimated Share w/ Ind. Stores	Adjusted Difference
		Model Estimates		Actual	Difference v. Without Prog	90% Conf Interval (+/-)		
		w/o Prog	With Program					
Clothes Washers								
1999	0.722	9.0%	15.2%	14.5%	5.5%	3.4%	26.3%	10.0%
2000	0.685	10.1%	16.5%	22.6%	12.5%	4.2%	27.3%	15.1%
2001	0.668	12.9%	20.1%	22.6%	9.7%	5.2%	32.3%	13.9%
2002	0.603	17.9%	27.7%	33.5%	15.6%	7.9%	n/a	n/a
Dishwashers								
2000	0.212	9.3%	9.5%	8.1%	-1.2%	4.4%	39.4%	0.0%
2001	0.386	12.5%	15.3%	14.8%	2.4%	4.6%	45.6%	7.3%
Room Air Conditioners								
2000	0.269	18.8%	20.7%	22.0%	3.2%	5.0%	21.2%	2.5%
2001	0.472	19.4%	21.1%	19.8%	0.4%	5.2%	11.2%	0.2%
2002	0.279	37.0%	47.6%	61.3%	24.3%	15.6%	n/a	n/a
Refrigerators								
2002	0.633	19.8%	22.9%	24.8%	5.0%	3.8%	n/a	n/a

These findings suggest that most Vermont consumers generally applied sober, well-informed economic calculations in deciding whether to buy ENERGY STAR appliances. We credit the efforts of the predecessor programs as well as the EPP to inform customers and retailers about the significant energy and water savings associated with ENERGY STAR clothes washers for their high market share.

After adjusting the model results to account for the differences in market share for chains and independent stores, we estimated the net market share attributable to the programs at 15.1 percent in 2000 and 13.9 percent in 2001. In the next section we convert these results to equipment units and energy savings.

In 2002, the model estimate of the impact of rebate programs on state-level market share of ENERGY STAR-qualified clothes washers (the difference between the model-estimated market share with and without programs) increased from to 9.8 percent from 7.2 percent in 2001. This indicates that the ENERGY Star market share grew more quickly in the states with programs than in those with no programs active. In Vermont, the ENERGY STAR market share among stores reporting to DOE increased even more rapidly: from 22.6 to 33.5 percent. This result is particularly noteworthy in light of the slight decrease between 2001 and 2002 in the number of rebates issued, and may be taken to represent progress in market transformation. We have not analyzed APT's clothes washer sales data for 2002, and thus do not have an estimate of the program's effect on total sales of ENERGY STAR dishwashers in the state.

Dishwashers. The dishwasher model included only the income and program variables. The t-statistic for the education variable was very low and it entered with a negative sign. It was therefore dropped from the model. In 2000, ENERGY STAR market share was strongly related to income whereas the presence of a promotion program appeared to have relatively little effect. This modeling result is consistent with our examination of the raw market share data, which showed little difference between groups of states characterized by the presence of promotion programs. See Table 6-13. In 2001, however, the modeling picked up a positive contribution to market share for the programs.

The model did a good job of predicting the actual market share for ENERGY STAR dishwashers in Vermont. The model estimate for 2000 was 9.5 percent v. the actual 8.1 percent; 15.3 v. 14.8 percent in 2001. We concluded that the comparison of the actual market share to the model estimate without the program was a reasonable estimate of net market effects. In 2000, this difference was – 1.4 percent. We therefore set the net program effect on ENERGY STAR washer sales to zero for 2000. One could argue that the high market share among independents (39.4 percent) provides an indication of market effects. However, the national average market share for dishwashers in 2000 was 10.9 percent versus 8.1 percent in Vermont, so we believe the zero effect estimate is justified for that year. In 2001, after making adjustments for sales by independents, the net contribution of the EPP to ENERGY STAR dishwasher market share was 7.3 percent.

In 2002, F statistic for the model did not reach critical value, that is: the model did not account for a statistically significant portion of total variation among states in the market share of ENERGY STAR models. In fact, as Table 6-11 shows, the median ENERGY STAR market share among the states with programs was lower than the national market share. It is not at all clear why this should have occurred. The finding does indicate, however, that there are many factors –likely features of the operation of the national appliance distribution system – that affect state-level market shares of ENERGY STAR appliances that we were not able to capture with the model.

Room Air Conditioners. The room air conditioner models did a good job of predicting actual ENERGY STAR market share in 2000 and 2001. Our overview of the room air conditioner market share data (see Table 6-14) suggested that the impact of promotion programs on ENERGY STAR model adoption was rather small in these years, and this was born out by the model results. The model came up with small, but discernible contributions to market share in both years. We concluded that our approach was reasonable for room air conditioners and estimated net contributions to ENERGY STAR market share of 2.5 percent in 2000 and 0.5 percent in 2001.

In 2002, the national market share of ENERGY STAR-qualified room air conditioners more than tripled to near 36 percent. Even in the midst of this broad upswing, the model results indicate that the presence of rebate programs was associated with higher market shares. The estimate of the coefficient for the program variable was 0.106, indicating that the presence of some kind of appliance rebate program was associated, on average, with an incremental ENERGY STAR market share of 10.6 percent. In Vermont, the actual market share achieved among retailers reporting to DOE was 61.3 percent, versus a model estimate of the share without the program of 37.0 percent. This extreme difference is likely attributable to EVT's offer of $25 rebates for the purchase of ENERGY STAR-qualified air conditioners during the summer of 2002. NYSERDA in New York an the larger Connecticut utilities also offered rebates for the purchase of ENERGY STAR air conditioners in the summer of 2002. The ENERGY STAR market share in these two states was 51 percent. The Vermont initiative, then, appears to have been particularly effective.

Refrigerators. As discussed in Section 6.2, Vermont's ENERGY STAR market share for refrigerators has been highly erratic, both in absolute level and in relationship to the national and regional figures. In 1999 and 2000, Vermont's market share was relatively high – 28 to 31 percent. This was slightly higher than the national average and 50 to 70 percent higher than the share in other states in which the NEEP program was operating. In 2001 Vermont's market share plummeted to 14.9 percent, below the national average and well below the levels in the other NEEP states. In the summer of 2002, EVT began to offer $25 rebates for qualifying refrigerators. The ENERGY STAR market share in Vermont rebounded to 24.8 percent in 2002. By way of comparison, the median ENERGY STAR refrigerator market share among states with rebate programs for one or more appliances was 22.9 percent versus 18.3 percent among states without rebate programs. Connecticut and California both hosted widely-available refrigerator rebate programs in 2002. The ENERGY STAR market shares in those states were 25.9 percent and 25.7 percent respectively.

In 2002, the model yielded statistically significant results ($R^2 = 0.63$, coefficients of all independent variables significant at $p<0.05$. The difference between the model-estimated market shares with and without the program was 5.0 percent. Nationwide, the model results indicate that, on average, the presence of the program contributed 3.1 percent to a given state's share of ENERGY STAR refrigerators purchased. The model-estimated market share with the program in place was 22.9 percent, versus the actual 24.8 percent. These results, along with those in Connecticut and California, suggest that rebate programs had a significant effect on the market share of ENERGY STAR-qualified refrigerators in 2002.

Estimates of Net ENERGY STAR Unit Sales due to the Program

Table 6-30 shows annual shipments per AHAM of the three appliances for which net program effects were estimated, the ENERGY STAR market share attributed to the program, the number of unit sales attributable to the program, and the MHW electric savings associated with those sales. The shipment figures for 2000 are adjusted to reflect the start-up of the EPP program in March of that year. Readers should also be aware that the AHAM shipment numbers are probably not completely accurate, as discussed in Section 6.2. However, we do not have a consistent set of data to use for adjusting the AHAM estimates.

Table 6-30
Net Impacts of the EPP: Unit Sales and Energy Savings

		Net Share Attributable to EPP		
Appliance/Year	**Shipments (AHAM)**	**Percent**	**Units**	**Energy Savings MWH/Year**
Clothes Washers				
2000	10,417	15.1%	1,577	946
2001	12,500	13.9%	1,741	1,045
Dishwashers				
2000	7,750	0.0%	-	
2001	8,500	7.3%	620	90
Room Air Conditioners				
2000	7,167	2.5%	178	13
2001	6,100	0.2%	14	1

7 PROCESS EVALUATION: APPLIANCES

7.1 INTRODUCTION

7.1.1 Objectives

In this section we review the design and operation of the appliance component of the EPP to assess the program's appropriateness to its objectives and the quality or program execution. Our overall objective is to identify concrete steps that EVT and the program contractors can take to improve program operations and results.

7.1.2 Key Findings

Findings from Sections 5 and 6, as well as the results of interviews with retailers and Mystery Shopper results reported in this section clearly indicate that the program was appropriately designed to meet its objectives and was well-executed. From an operational standpoint, the program has two key objectives. The first is to inform consumers of the benefits of efficient appliances. The second is to support retailers in carrying out their role of stocking ENERGY STAR qualified products and furnishing rebates in an efficient, customer-friendly manner. Moreover, given the importance of appliance sales staff in influencing customer model selection decisions, training of sales staff to understand and sell the advantages of efficient appliances is an important element of program operations.

Informing Customers. The Phase 1 evaluation effort devoted very few resources to investigating customers' perceptions concerning efficient appliances and the ENERGY STAR label. The on-site survey did include 25 customers who reported purchasing appliances they believed to be energy-efficient over the year prior to the survey. Only three of these customers mentioned the ENERGY STAR label explicitly in discussing influences on their selection of models. The sample here is too small to support generalizations concerning the effect of the program on customer knowledge of or interest in energy-efficient appliances.

The program has generally done a good job in educating retailers concerning the advantages of ENERGY STAR clothes washers. Evidence of program effectiveness in regard to the other appliances is less clear. However, it should be understood that, without rebates, the program has relatively little leverage to influence retailer behavior in stocking and promoting ENERGY STAR appliances. Findings presented in Section 6 indicate that retailers are much more strongly influenced by the product promotion decisions of manufacturers and by their independent judgment concerning the nature of their customers' preferences.

Retailer Recruitment and Support

- ***Commercial context*.** In contrast to retailers participating in the lighting program, managers of retail locations in the appliance program believed that promotion of ENERGY STAR appliances was important to the overall business objectives of their establishments. Two-thirds of the retailers interviewed rated the importance of ENERGY STAR promotion at 7 or above on a 10 point scale.
- ***Percentage of potential retailers enrolled.*** Comparison of program records and counts of establishments from Dun & Bradstreet indicates that the program has enrolled virtually all retail locations that sell significant volumes of appliances in Vermont.
- ***Promotion practices.*** Generally, we found that the sales staff effectively promoted ENERGY STAR clothes washers, for which rebates were available, but did little to promote the other appliances addressed by the program. Moreover, their general level of knowledge concerning the meaning and interpretation of the EnergyGuide and ENERGY STAR labels were low, and their representation of various models as ENERGY STAR-compliant was occasionally inaccurate. For example, only 8 percent of the refrigerators that were represented as energy efficient actually qualified for the ENERGY STAR label.

  There are a number of potential explanations for the finding that salespersons were much more enthusiastic and effective at selling ENERGY STAR clothes washers than the other covered appliances.

  - Resource-efficient clothes washers have been eligible for rebates in Vermont since 1997, whereas other appliances have not been eligible for rebates.
  - With recent changes in federal standards, the difference in energy consumption between standard and ENERGY STAR refrigerators and dishwashers is meager. For a 20 cubic foot refrigerator, for example, the difference is only 100 kWh per year, or about $12 at current rates. The incremental cost for an ENERGY STAR unit, on the other hand, is over $400. The customer's cost-benefit ratio for purchasing an ENERGY STAR dishwasher is similarly low. In these cases, the salesperson may have already decided that the customer would be better satisfied by spending money on features other than energy efficiency. Annual energy and water cost savings associated with ENERGY STAR clothes washers are significantly higher, although simple payback periods are still in the range of 6 to 8 years.
  - Salespeople focused their attention and energy on learning about equipment that was eligible for rebates, which help overcome customer objections to higher initial cost.

  Salespersons selling practices seem to be fairly rational, given the low cost-benefit ratio for refrigerators and dishwashers, the dip in ENERGY STAR model availability associated with 2001 changes in standards, and the long-standing availability of rebates for washers. On the other hand, the fairly widespread confusion about the meaning of the ENERGY STAR label, the EnergyGuide label, and qualifying products suggests that salespersons' behavior did not, in every case, proceed from thorough or accurate knowledge of the

products and the program. We note that the Mystery Shopper visits in 2001 found much higher levels of salesperson knowledge of ENERGY STAR products and greater willingness to promote them than the mystery shopper visits conducted for the 1999 *Appliance Baseline Study*. At that time, only one of 20 appliance sales staff encountered were able to provide accurate information about the ENERGY STAR label and its meaning for appliances.

- ***Retailer response.*** Retailers interviewed for this evaluation gave consistently high marks to EVT and APT for all aspects of program administration and support: product placement, sales force training, and coupon processing.

7.1.3 Recommendations

As discussed in Section 6, the four appliances supported by the ENERGY STAR appliance program are subject to very different market dynamics on both the consumer and supplier sides. We therefore develop our recommendations in regard to the separate appliances rather than for the program as a whole.

Clarify program design in regard to refrigerators, dishwashers, and room air conditioners. The results of the analysis in Section 6 suggest that the program is having relatively little effect on retailer practices or customer purchases in regard to refrigerators, dishwashers, and room air conditioners. The findings also suggest that the circumstances that lead retailers to promote ENERGY STAR models (or not) differ between independents and chain establishments, and that these circumstances may differ between independents in various niche markets. Given these findings, XENERGY believes it would be worthwhile to gather information from retailers regarding their motivations and barriers to promoting specific ENERGY STAR appliances, to brainstorm program ideas that might result in a more consistent level of effort, and to review the proposed program initiatives that emerge from this process. The process of gathering information could be conducted within the context of the next round of evaluation, and could take the form of in-depth interviews or focus groups. We recommend that EVT and APT staff participate in the process, as well as selected retailers.

Clothes Washers: Retention of customer incentive. Given the growing market share of ENERGY STAR clothes washers nationwide, the high volume of purchases outside the program in Vermont, and the impending increase in federal minimum efficiency standards, it may seem tempting to remove or reduce the incentive. We believe that retention of the incentive for 2003 is warranted for a number of reasons. First, the net effects analysis estimated that the program stimulated purchase of 1,741 ENERGY STAR units in 2001, compared to program sales of 2,563. This suggests that a large portion of the customers who are interested in resource-efficient washers still need the incentive to help them overcome objections to the high incremental cost. Also, in the case of products such as refrigerators and electric motors, promulgation of new federal standards was preceded by steep price cuts in lower-end products as manufacturers and distributors dumped non-complying inventory. This will likely happen in the clothes washer

market as well. Incremental costs are likely to increase as 2004 approaches, so it will be a good idea to leave the incentive in place.

Refrigerators: Differentiated retailer support. The large chain stores already appear to be stocking, displaying, and selling a relatively high portion of ENERGY STAR refrigerators. It is the independents who are lagging. One potential service that APT could offer to independents would be to monitor, through the AHAM Directory and contacts with manufacturers, the availability of ENERGY STAR-qualified refrigerators appropriate for different customer segments. Practically, that would mean identifying lists of qualifying models in different price ranges and feature categories, and informing independent retailers about models that fit their particular customer profiles.

7.2 IN-STORE PROMOTION AND SALES PRACTICES

Overview

Many studies have found that customers' interactions with sales floor staff have a great deal of influence on appliance selection. Unlike lighting product purchases, retail purchase of appliances generally cannot be accomplished without interaction with sales staff. Given that these are infrequent purchases and that energy efficiency generally ranks low as a model selection criterion, guidance from the sales person can be important in encouraging a customer to select an ENERGY STAR product, particularly given the significant incremental costs of those products. Among the participants in the on-site survey who purchased appliances in the 12 months prior to the survey, appliance retailers were mentioned most often (35 percent) of all sources of information concerning product selection. Among purchasers of new homes, appliance retailers were mentioned most often (66 – 76 percent depending on the particular appliance) as a source of input or information for model selection.

XENERGY conducted a series of scripted appliance mystery shopper visits to a representative sample of eight Vermont retail locations to gather information on the effectiveness of sales person efforts and point of purchase materials in promoting ENERGY STAR products. All of the sample retailers were participants in the program. The 1999 Baseline study also conducted a set of mystery shopper visits. The results of these research efforts are summarized below.

Generally, we found that the sales staff effectively promoted ENERGY STAR clothes washers, for which rebates were available, but did little to promote the other appliances addressed by the program. Moreover, their general level of knowledge concerning the meaning and interpretation of the EnergyGuide and ENERGY STAR labels were low, and their representation of various models as ENERGY STAR-compliant was occasionally inaccurate. For example, only 8 percent of the refrigerators that were represented as energy efficient actually qualified for the ENERGY STAR label. It should be noted that at the time of the study, the average difference in efficiency

between standard and ENERGY STAR refrigerators had narrowed to 10 percent, with annual energy savings upon upgrade ranging from 60 to 110 kWh.

Objectives

The main objective of the mystery shopper visit was to gather first-hand information concerning point-or-purchase displays and salesperson efforts to promote ENERGY STAR equipment and the Efficiency Vermont (EVT) rebate program for clothes washers. With input from the Department of Public Service (DPS), EVT, and other consultants, XENERGY developed a mystery shopper script designed to gather information on the following issues:

Point of Purchase Materials

- What types of point-of-purchase materials were visible in the appliance display areas?
- Who were the sponsors of this material: the manufacturers, ENERGY STAR, the EVT program?
- Were these materials effective in communicating the differences among products, the benefits of ENERGY STAR products, and the benefits of program participation?

Salesperson Performance

- Were salespersons knowledgeable about the meaning of the ENERGY STAR label, the meaning of the Energy Guide label, the EVT washer program, and the advantages of qualifying versus non-qualifying products?
- Did salespersons make an effort to promote ENERGY STAR products?

Sampling

XENERGY selected sample retail locations to reflect the make-up of stores in the participant database in terms of type (independent, small chain, national chain) and location. We included five independent stores, two national chain stores, and one small chain in the mystery shopper sample. All eight stores included in this research were participating in the Efficiency Vermont program when the mystery shopper visit was conducted.

Key Findings

The key findings from the mystery shopper visits are as follows.

Point-of-Purchase Materials

- ***Visibility of Materials.*** Some kinds of ENERGY STAR point-of-purchase (POP) materials were observed in seven of the eight stores visited. Most of these materials were small items such as stickers or magnets. The appliance most likely to have POP advertising was the refrigerator. All of the POP materials displayed were fairly easy to see and adequately displayed.

- ***Effectiveness of materials.*** Except for the EVT rebate application, none of the point-of-purchase materials provided information that would help customers understand the significance of the ENERGY STAR or EnergyGuide labels.

Salesperson Performance

- ***Levels of Knowledge and Promotion: Clothes washers (rebates) v. dishwashers and refrigerators (no rebates).*** Salespersons were clearly more knowledgeable about and eager to promote energy efficient clothes washers v. dishwashers or refrigerators. Seventy-three percent of the individual washers shown initially to the mystery shopper (without prompting about energy efficiency) were ENERGY STAR models. By contrast, 46 percent of the refrigerators and 36 percent of the dishwashers shown were represented as being "energy efficient" by the salespersons. Further checking revealed that only 8 percent of the refrigerators shown were actually ENERGY STAR-qualified.
- ***Unprompted promotion of efficient products.*** Six of the eight sales staff showed at least one type of energy-efficient appliance without being prompted by the shopper.
- ***Ability to explain the EnergyGuide label.*** Four of the salespeople were asked (the others volunteered their explanation) the question, "What does the EnergyGuide label mean?" Only four of the eight salespeople adequately described that the label represents how the appliance compares with other similar appliances (in terms of energy use) and provides a guide for how much the appliance will cost you to run it per year. The other half provided misleading or false statements.
- ***Representation of the ENERGY Star label.*** All of the salespeople interviewed knew that the ENERGY STAR label on appliances indicated energy efficiency. However, some did not provide a positive explanation of the label. Particularly in regard to refrigerators and dishwashers, a number of salespersons represented the difference in energy consumption between ENERGY STAR and conventional models as being negligible and "not worth the extra expense". Table 7-1 displays energy savings, incremental costs, and simple payback periods for the four appliance types at the time the mystery shopper visits were made. We made calculations for two common refrigerator calculations and one mid-sized room air conditioner, using the ENERGY STAR savings calculator available on the program's web site. Table 6-5 shows that the sales persons' perceptions of the economics of purchasing an ENERGY STAR refrigerator were accurate. The payback period is significantly longer than the 14 year useful life of the appliance for both configurations listed. The economics for dishwashers and clothes washers are considerably better, although by no means outstanding, given the high implicit discounts that customers attribute to energy savings realized over time.[1] It is anticipated that the incremental prices of ENERGY STAR refrigerators and clothes washers will decrease as manufacturers realign product rosters to account for changes in federal standards.

[1] **Adam Jaffe and Shimon Awerbuch articles.**

Table 7-1
Energy Savings, Incremental Costs, and Payback Periods

Appliance/Description	Savings kWh/Year	Savings $ per Year*	Incremental Cost: Fall '01	Payback Period Years
Refrigerator: top mount 22 cf	105	$ 13.55	$ 252	18.6
Refrigerator: side mount w/ice 28 cf	147	$ 18.96	$ 500	26.4
Dishwasher	145	$ 18.71	$ 118	6.3
Room AC: 10,000 btu/hour	71	$ 9.16	$ 27	2.9
Clothes Washer: EF = 2.65	565	$ 94.89**	$ 474	5.0

***** At $0.129 per kWh.

** Includes 8.3 CCF in water savings @ $2.45. Also assumes electric water heat.

While appliance sales staff were not consistently enthusiastic and knowledgeable in promoting ENERGY STAR appliances, their performance in this regard appears to have improved markedly between the 1999 *Baseline Study* and the 2001 visits. The *Baseline* mystery shopper visits found, for example, that only 1 in 20 of the sales was knowledgeable about the ENERGY STAR label and about utility programs in effect at the time. Forty percent of the stores visited had no ENERGY STAR qualifying models on display, and none of the stores had any promotional material about ENERGY STAR or the utility programs available.

7.3 RETAILER RESPONSE TO PROGRAM

Training Provider. All twelve respondents reported receiving some type of training to support sales of ENERGY STAR products. However, as Table 7-2 indicates, there was some confusion on the part of respondents regarding the training: one-half indicated that they did not know who sponsored the training they received. These respondents may not recognize the EVT training as "official trainings" because the EVT program delivers relatively informal sessions with sales staff.

Table 7-2
Retailer Perceptions about Training

Training Sponsors	Chain Stores	Independent Stores	Overall
Don't Know	67%	44%	50%
Energy Star	33%	11%	17%
Efficiency Vermont	0%	22%	17%
The EPA	0%	11%	8%
Appliance Manufacturer	0%	11%	8%
Number of Respondents	3	9	12
Effectiveness of training			
Very Effective	100%	40%	63%
Somewhat Effective	0%	60%	37%
Number of Respondents	3	9	12

Training Effectiveness. Although most respondents were not sure who sponsored the training, over 60% thought it was very effective with the remainder believing it was somewhat effective.

Five respondents described the informal store visits as occurring once per month. All five respondents reported having less than five employees present for these sessions. Of these five respondents, three indicated it was difficult (from their own end) to schedule a time when all of their sales staff could be present for the trainer's visit.

7.4 PROGRAM RESPONSE

As mentioned earlier, some respondents who were interviewed for this study were unsure whether they participated in the EVT program and, if so, who sponsored the program. Therefore, obtaining feedback about the program was difficult because the respondents were unsure of the program which we were inquiring about. The respondents who did complete this section appeared relatively familiar with the EVT program thus we felt their responses were reliable.

Program Awareness & Participation. As summarized in Table 7-3, three-quarters of those surveyed said they were aware of Efficiency Vermont's promotion and support program. Fifty-eight percent reported being enrolled in the program while the remaining 42% were not sure. After crosschecking these stores against EVT program records, it is apparent that all twelve stores are participating in the EVT program. Thus there appears to be substantial confusion among respondents regarding the EVT program. For example, one of the independent retailers who was uncertain if her store was enrolled in the Efficiency Vermont program indicated that she was very confused the relationship between ENERGY STAR and Efficiency Vermont.

Table 7-3
Program Awareness and Participation

Aware of the EVT program	Chain Stores	Independent Stores	Overall
Yes	67%	78%	75%
No	33%	22%	25%
Number of Respondents	3	9	12
Enrolled in EVT Program			
Yes	67%	56%	58%
Don't Know	33%	44%	42%
Number of Respondents	3	9	12

Program Ratings. Of the respondents who indicated that they were enrolled in the Efficiency Vermont program, Table 7-4 displays the ratings these participants gave various aspects of the program. The ratings are based on a five-point scale, where "5" is very good and "1" is very poor. All three elements of the program received good ratings, especially the in-store promotional assistance and the rebate processing. Training received the lowest average rating – a 3.4.

Table 7-4
Ratings for Efficiency Vermont Program Elements

Rating	Program Element		
	Assistance with in-store promotions	Training	Rebate Processing
1 – Very Poor	0%	0%	0%
2	0%	20%	0%
3	17%	40%	0%
4	17%	20%	17%
5 – Very Good	67%	20%	83%
Average Rating	4.5	3.4	4.8
Number of Respondents	6	5	6

Program Feedback. The follow-up questions to each of the program ratings did not yield the type of anecdotal program experiences that might have been anticipated. Instead, most respondents indicated that the rating they gave the program element reflected their perception without providing any additional feedback. However, one independent retailer noted that the rebate processing through the EVT program was "excellent." Another independent retailer expounded that rebates served as customer incentives to purchase ENERGY STAR appliances, and therefore, strongly influenced their stocking and promotional practices.

Retailers surveyed from two national chain stores thought the program was very good, but that it would be helpful if Efficiency Vermont focused on the customer (perhaps a state-wide blanket mailing) to increase awareness about ENERGY STAR rebates, promotions, or features that might bring people into their stores. Once the customer comes through the doors, one retailer reasoned, they are either going to buy an appliance or not—it was their job to take it from there and make sure the customer had as much information as they wanted to make that decision.

Independent retail store respondents focused their recommendations on increasing the amount of individual rebates, in order to give them more leverage with closing a potential sale. Two of these retailers suggested that Efficiency Vermont increase the amount of money (in commissions) that retailers receive.

8 ADDITIONAL ENERGY SAVINGS OPPORTUNITIES

8.1 INTRODUCTION

8.1.1 Objectives

XENERGY undertook an on-site survey of a random sample of existing Vermont homes to support elements of both the Efficient Products and Residential New Construction program evaluations. The specific objectives of the survey were to:

In regard to the EPP evaluation

- Generate direct observations of the saturation of compact fluorescent bulbs and compact fluorescent fixtures to support assessments of the level of customer acceptance of lighting products promoted by the EPP.
- Generate direct observations of the saturation of ENERGY STAR® appliances to support assessments of customer acceptance of efficient appliances.
- Develop information on holdings and efficiency levels of other kinds of energy-using equipment, including appliances not currently covered by ENERGY STAR specifications and windows.
- Support estimates of energy savings that could result from pursuing additional energy savings opportunities from products that are generally sold directly through retail channels directly to consumers: lighting and appliances.

In regard to the RNC evaluation

- Generate of the condition and efficiency characteristics of housing components that are generally furnished by local construction trades: insulation; windows; heating, cooling, and ventilation systems; and water heaters.
- Characterize potential energy savings in these systems.

8.1.2 Methods

Sample Development and Recruitment. XENERGY drew a random sample of potential survey respondents from a commercially available residential directory covering the entire state of Vermont. Subcontractor Research America recruited potential participants over the phone during April 2002. To qualify for inclusion in the sample, respondents had to meet the following criteria:

- Homes could be owner-occupied or rental properties
- Homes could be single-family detached, townhouses, manufactured homes, or single units within multifamily homes that have separate heating and cooling systems
- Homes must have been built more than five years ago (before 1997)
- Homes must be occupied year-round (no seasonal properties)

To expedite recruitment and reduce non-response, respondents who met these criteria were offered a $50 incentive for their participation. Research America identified 125 potential respondents who met the criteria and were willing to be interviewed. This list of willing survey participants was forwarded to a team of trained home auditors for scheduling. In May 2002, an advance letter was sent to all customers who agreed to participate reminding them of their upcoming auditor visit, and individual auditors then called to schedule onsite surveys. Auditors completed 71 onsite surveys with Vermont residents between June and August of 2002.

Survey Approach and Contents. Once on site, auditors distributed a concise self-administered questionnaire to the customer and then proceeded to inspect the home and conduct a brief post-interview with the customer. Self-administered surveys were collected by the auditors and returned to XENERGY for analysis along with the onsite surveys. The onsite research was designed to assess selected home features in order to characterize the energy efficiency and energy saving opportunities in existing homes. During each onsite survey, auditors performed the following tasks:

- *Building Shell*. Record the age and type of home, square footage, number of floors, number and types of windows, and general information on levels of insulation. Note any obvious leaks or insulation problems.
- *Fuel Consumption.* Record annual usage of electricity, natural gas, oil, kerosene, liquid propane, and fuel wood.
- *Appliance Inventory*. Record detailed information on major appliances including dishwashers, oven ranges, refrigerators, stand-alone freezers, clothes washers, clothes dryers, and room air conditioners including number, age, fuel type, manufacturer, and model number. Indicate number of additional appliances including microwave ovens, ceiling fans, water beds, central vacuum, saunas, Jacuzzis, hot tubs, swimming pools, humidifiers, and dehumidifiers. Note room locations for humidifiers and dehumidifiers.
- *Lighting Inventory.* Record fixture type, number of bulbs by type, controls (dimmer, motion sensor, timer, etc.), room location, and source of CFL products purchases.
- *Ventilation*. Record type, location, controls, manufacturer, and , if visible, model number for all ventilating fans.
- *Windows.* Record number, size, and location of all windows. Detail glazing type and other characteristics and rate overall condition of windows.

- *HVAC*. Record system type, size, age, condition, and efficiency (if available) of all centralized heating and cooling equipment. In addition, record condition and insulation of distribution system, thermostat type, and number of woodstoves, space heaters, and fireplaces.
- *Hot Water*. Record system type, size, age, and location, and detail insulation of pipes and heating unit.
- *Insulation.* Record presence, type, location, thickness, R-value, and other characteristics of insulation in attic and frame floors.

Auditors also recorded major energy savings recommendations for the above features. Each onsite survey took roughly two hours to complete.

The self-administered customer surveys asked respondents to do the following:

- *Efficiency Upgrades*. Record recent and intended efficiency upgrades, as well as the barriers to following through on desired upgrades.
- *Efficient Products.* Specify sources of information on efficient products and contractors.
- *Efficiency Vermont*. Indicate awareness of Efficiency Vermont and the services provided by the organization. The findings from this part of the survey are reported in Sections 3 and 6.

In this section we report on the results of the on-site survey related to appliances, lighting, and other products that reach consumers through retail outlets. Results referring to building shell features such as insulation and windows, as well as heating and cooling equipment are reported and analyzed in Section 6 of the Residential New Construction program evaluation.

8.1.3 Key Findings

Characteristics of the respondents. In interpreting the results of the on-site survey it is necessary to keep in mind the characteristics of the respondents and differences between the sample and population of Vermont households. The sample contained only homeowners. Generally, the educational level of the respondents was higher than the population as a whole. For example, 40 percent of the respondents held college degrees versus 29.4 percent of the population. The respondents generally had lower incomes than the population as a whole, and occupied larger and older homes. Thus, they were likely more aware of energy efficiency opportunities than their peers, and more concerned to exploit them due to their higher-than-average burden of energy costs. Also, given that the survey required an auditor to be in the home for two hours, customers with an interest in energy efficiency were more likely to participate in the survey than those who were not interested.

Energy saving opportunities for appliances. Analysis of the on-site survey data identified the following opportunities for significant energy savings in appliances.

- ***Early retirement of refrigerators and freezers.*** Based on the results of the survey, we estimate that there are over 80,000 refrigerators and 76,000 standalone freezers currently in use in Vermont homes that are older than their engineering useful life – 14 years. The metered use of units from this vintage averages over 2000 kWh per year, versus 550 – 1000 kWh per year for comparable new units of standard efficiency. There were some 30 to 40 year-old units in the sample homes. Moreover, nearly 15 percent of the refrigerators installed were second units, most of which were in continuous use. Recent evaluations of refrigerator/freezer recycling programs have found net savings in the range of 50 – 60 percent, after taking into account free ridership and the alternative dispositions available to customers. The considerable gross energy savings available from removal or replacement of very old units, combined with the large number of applicable units identified suggest that further development of program details and measure screening efforts are justified.
- ***Energy Star freezer promotion.*** The Department of Energy is currently considering adding stand alone freezers to the roster of products eligible to receive the ENERGY STAR label. The labeling specifications under consideration would result in unit energy savings of 40 – 60 kWh per year for the most common sized models. Freezer shipments have been rising recently and, should the ENERGY STAR specification be promulgated, it may be worthwhile to support freezers as part of the EPP.

Energy saving opportunities in lighting. Despite the success of the EPP lighting component, there remains a great deal of potential for additional application of CF technology in existing homes. The on-site survey found that 1.5 percent of all fixtures in respondents' homes, and 5.8 percent of all bulbs used compact fluorescent technology. Given the nature of the sample for the on-site survey, we believe that the actual saturation of CF bulbs and fixtures in the population of all Vermont housing units is somewhat lower. These findings suggest that continued promotion of CF bulbs and fixtures is justified, and should be pursued through retailer, builder, and renovation contractor channels.

8.2 RESPONDENT CHARACTERISTICS

In this section we summarize the key demographic, housing, and energy use characteristics of the survey respondents. Our primary concern here is to assess the representativeness of the sample. To do this, we compare the distribution of the sample along these demographic and housing dimensions to the distribution of the population as a whole, as provided by the Census and other broad surveys.

8.2.1 Demographic Characteristics

Education. Many studies have shown that level of education is associated with interest in and adoption of energy-efficient products and services. Table 8-1 shows the distribution of the on-site respondents by highest level of educational attainment versus the distribution of the Vermont population of individuals over 25. The distribution of respondents is somewhat higher, with 40

percent college graduates versus 29.4 percent for the population as a whole. Only 3 percent of the respondents had not finished high school versus 13.5 percent of the population as a whole.

Table 8-1
Educational Attainment of On-site Respondents v. Vermont Population

	Sample		Population
Highest Level of Education Completed	**Frequency**	**Percent**	**2000 Census**
Graduate degree	10	14%	11.1%
Some graduate school	4	6%	n/a%
College graduate	15	21%	18.3%
Some college (including Associates Degree)	13	19%	24.6%
Trade school / high school graduate	26	38%	32.4%
Some high school	2	3%	8.4%
Less than 9th Grade	0	0	5.1%
Number of Respondents	**70**	**100%**	

Income. Table 8-2 shows the distribution of the respondent households and Vermont households by income. Unlike the education distribution, the income distribution of the respondents sits somewhat lower than that of the Vermont population as a whole. Only three percent of the respondents reported household incomes above $100,000 versus 11 percent of the Vermont population; 12 percent of the sample reported incomes above $75,000 versus 23.3 percent of the population. The sample also contained a somewhat higher percentage of households with incomes below $25,000 than the population.

Table 8-2
Household Income of Onsite Respondents v. Vermont Population

	Sample		Population
Income	**Frequency**	**Percent**	**2000 Census**
$100,000 or more	2	3%	11.3%
$75,000 - 99,999	6	9%	12.0%
$50,000 - 74,999	16	23%	25.0%
$25,000 - 49,999	28	41%	33.0%
$0 - $24,999 per year	17	25%	18.6%
Number of Respondents	**69**	**100%**	**-**

8.2.2 Housing Characteristics

Home Age, Size, Occupancy, and Other Characteristics. Table 8-3 provides an overview of home age, size, and other characteristics for survey participants. Table 8-4 shows the distribution of the age of sample houses versus the population. A number of key differences between the sample and the population emerge from the tables.

- ***Owners and renters.*** All of the sample respondents were homeowners, whereas renters account for nearly 30 percent of Vermont households. Thus, the survey needs to be understood as a study of homeowners, who constitute the primary market segment for the EPP.
- ***Type and size of home.*** In keeping with the exclusive participation of homeowners, the houses in the sample were larger than the average Vermont dwelling. Ninety-four percent of the houses in the on-site sample were detached single-family homes, versus 65.6 percent in the population. The median number of rooms in the sample houses was 7, versus 5 for the population as a whole.

Table 8-3
Overview, Characteristics of Survey Participants' Homes

Housing Characteristic	Sample Mean or Median	Census 2000 Value
Number of Rooms (Range: 2 – 14)	7	5
Home Size in Square Feet (Range: 540 – 4,000)	1,675	n/a
Number of Occupants (Range: 1 – 8)	2.5	2.58
Percent Owner Occupied	100%	70.6%
Detached Single-Family Home	94%	65.6%
Number of Respondents	**71**	

Age of home. The age distribution of the sample homes was weighted to more to older cohorts than the population as a whole. Forty five percent of the sample homes were built prior to 1940, versus 30 percent for the population, and a third of the sample homes were over 100 years old.

Table 8-4
Distribution of On-site Respondents' Homes by Year Built v. Census

	Sample		Population
Year Built	**Frequency**	**Percent**	**Census 2000**
1939 or earlier	31	45%	30.0%
1940 – 1959	5	7%	11.3%
1960 – 1969	5	7%	10.4%
1970 – 1979	17	25%	17.3%
1980 – 1994	11	16%	24.3%
Number of Respondents	**69**	**100%**	

8.2.3 Energy Characteristics

Primary heating fuel. Table 8-5 shows the sample and Census distribution of households by primary heating fuel. The respondents closely resemble the population as a whole in terms of primary heating fuel.

Table 8-5
Distribution of On-site Respondents' Homes by Primary Heating Fuel v. Census

	Sample		Population
Heating Fuel	**Frequency**	**Percent**	**Census 2000**
Oil/Kerosene	42	59%	58.6%
Natural Gas	11	15%	12.1%
Liquid Propane	6	8%	14.4%
Wood	4	6%	9.4%
Electric	4	6%	4.7%
Other/None	4	6%	0.4%
Total Heating Systems	**71**	**100%**	

8.2.4 Conclusions and Implications for Interpretation of Results

The comparisons between the on-site survey respondents and the results of the 2000 U. S. Census identified the following important points of difference between the sample and the population of all households.

- The sample contains only homeowners whereas renters make up nearly 30 percent of Vermont households.

- The significantly higher portion of the sample hold BAs and graduate degrees than the population as a whole.
- The sample contains a significantly lower number of households with income over $75,000 than the population as a whole.
- The sample households generally occupy larger and older houses than the population as a whole.

This combination of characteristics suggests that the sample households are likely to show a greater interest in energy efficiency than the population as a whole, and to adopt efficient products and services more readily. They are better educated and thus likely to be better informed on these issues. Moreover, they may have greater need to adopt energy efficiency measures because their incomes are relatively low, yet they own larger and older homes. This pattern is consistent with respondent self-selection for surveys on energy-efficiency related topics, and should be kept in mind when reviewing and interpreting the results of the on-site survey.

8.3 APPLIANCE HOLDINGS, PURCHASES AND ENERGY EFFICIENCY OPPORTUNITIES

8.3.1 Overview of Appliance Holdings and Energy Efficiency

Number and Type of Appliances per Household. Table 8-6 shows the number of refrigerators, clothes washers, dishwashers, and room air conditioners that were found in the sample homes. All respondents owned at least one refrigerator and 14 percent owned two. Other appliances with very high saturations were clothes washers, oven ranges, clothes dryers, microwaves, and ceiling fans.

Table 8-6
Appliance Holdings by Sample Households

Appliance	% of Households			Mean Number per Household	Total Appliances of Type
	Number of Appliances (Cumulative)				
	1 or more	2 or more	3 or more		
ENERGY STAR-covered					
Refrigerator	100%	14%	-	1.14	81
Clothes Washer	94%	1%	-	0.96	69
Dishwasher	54%	-	-	0.54	38
Room Air Conditioner	27%	9%	3%	0.38	25
Other Appliances					
Oven Range	100%	7%	-	1.07	76
Clothes Dryer	86%	1%	-	0.87	62
Microwave Oven	82%	3%	-	0.85	58
Ceiling Fan	61%	36%	11%	1.24	43
Stand-Alone Freezer	51%	4%	-	0.55	39
Dehumidifier	29%	1%	-	0.31	21
Humidifier	18%	-	-	0.18	13

Appliance Age. For many of the 11 appliance types listed above, auditors recorded the appliance age (Table 8-7) and assessed whether the appliance should be immediately replaced .

Table 8-7
Appliance Age Distribution Among Survey Participants by Appliance Type

Appliance	Appliance Age (in Years)						Mean Age (Years)	Age Range (Years)	N
	< 2 years	2 – 5	5 – 10	10 –15	15 – 20	> 20 years			
Dishwasher	32%	11%	30%	11%	5%	11%	9.00	0.75 - 28	37
Oven Range	16%	16%	28%	14%	9%	16%	13.26	1 – 100*	74
Refrigerator	21%	18%	26%	19%	8%	8%	9.46	0.25 - 34	77
Stand-Alone Freezer	11%	14%	19%	11%	19%	27%	15.74	0.5 – 41	37
Clothes Washer	20%	20%	28%	13%	9%	10%	9.19	0.25 – 26	69
Clothes Dryer	16%	21%	25%	20%	5%	13%	10.18	0.25 – 33	61
Room Air Conditioner	36%	20%	8%	20%	12%	4%	8.76	0.5 - 44	25

* Antique model.

The relatively long "tail" of the age distribution suggests that significant energy savings could be achieved by accelerating the retirement of models that older than their useful lives. Potential savings from programs to accomplish this objective are assessed at the end of this section.

ENERGY STAR Qualification of Appliances. ENERGY STAR labels are available for dishwashers, clothes washers, refrigerators, and room air conditioners. Therefore the model numbers recorded by auditors were compared to a list of ENERGY STAR qualifying model numbers for these appliances. This exercise revealed that approximately 16 percent of dishwashers, 10 percent of clothes washers, 5 percent of refrigerators, and 6 percent of room air conditioners in the survey were ENERGY STAR qualifying models (Table 8-8). This proportion is based on appliance where a model number could be recorded. Because older models (those manufactured before the label was issued) are unlikely to have model numbers which are visible or legible, these estimates probably overestimate the saturation of ENERGY STAR models.

Table 8-8
ENERGY STAR Qualification of Dishwashers, Clothes Washers, Refrigerators, and Room Air Conditioners Among Survey Respondents

Appliance	Total Number	Total with Known Model Number	Total ENERGY STAR Qualifying	% ENERGY STAR Qualifying (of Appliances with Known Model Number)
Dishwasher	38	37	6	16%
Clothes Washer	69	61	6	10%
Refrigerator	81	74	4	5%
Room Air Conditioner	25	16	1	6%
Overall	**213**	**188**	**15**	**8%**

8.3.2 Details on Individual Appliances Pattern of Use and Conditions

ENERGY STAR-Covered Appliances

Refrigerators. All of the survey participants had at least one refrigerator in their homes. Despite a fairly low mean age as compared with other appliances in the survey, auditors recommended replacements for approximately 37 percent of the units in the survey (22 percent immediately, 15 percent some time in the future). Additional characteristics of refrigerators in the survey are included in Table 8-9.

Table 8-9
Refrigerator Characteristics

Refrigerator Characteristic	Mean or % of Total
Mean Size (Cubic Feet)	22 ft^3
Median Size	17 ft^3
Continuously Operating	98%
Intermittently Operating	2%
Located in Conditioned Space	94%
Located in Unconditioned Space	6%
Number of Units	81

Clothes Washers. Approximately 94 percent of households in the onsite survey had one or more clothes washers. Clothes washers were in the mid-range for age and efficiency rating compared to other appliances in the survey. Surprisingly, auditors recommended that 40 percent of clothes washers in the survey be replaced, either immediately (10 percent) or some time in the future (30 percent). This is likely due to the availability of higher efficiency front-loading models (presently in the homes of 18 percent of survey participants).

Dishwashers. Approximately 54 percent of onsite survey participants had dishwashers in their homes. Dishwashers rated highest on the efficiency scale, and many units were among the newer appliances in the survey. For these reasons, auditors made no recommendations for energy saving opportunities for 87 percent of dishwashers in the survey. For the remainder, recommendations included replacing now (11 percent of total dishwashers) or in the future (3 percent of total).

Room Air Conditioners. Slightly more than one-fourth (27 percent) of homes in the survey had at least room one air conditioner. Room air conditioners had the lowest mean age of all appliance types in the survey, and auditors did not recommend immediate replacement for any of the units as an energy saving opportunity. Future replacement was suggested for approximately 28 percent of the room air conditioners in the survey, and cleaning was recommended for approximately 12 percent.

Other Appliances

Stand-Alone Freezers. Stand-alone freezers were present in approximately 51 percent of the homes in the onsite survey. Auditors recommended replacement for approximately 36 percent of these units, which is not surprising considering their high mean age (approximately 16 years) and fair energy efficiency condition rating (3.20). Immediate replacement was recommended for 23

percent of the units in the survey, and eventual replacement was recommended for 13 percent of the units. See Table 8-10 for more information.

Table 8-10
Freezer Characteristics

Freezer Characteristic	Mean or % of Total
Mean Size (Cubic Feet)	17 ft^3
Continuously Operating	95%
Intermittently Operating	5%
Located in Conditioned Space	51%
Located in Unconditioned Space	49%
Number of Units	39

Clothes Dryers. Sixty-two percent of onsite survey participants had clothes dryers in their homes. Of these, approximately 82 percent were powered by electricity; an additional 10 percent were powered by liquid propane and 6 percent by natural gas. Other characteristics of clothes dryers are detailed in Table 8-11.

Table 8-11
Clothes Dryer Characteristics

Clothes Dryer Characteristic		% of Total
Vent to . . .	Outside	58%
	Unconditioned Space	24%
	Conditioned Space	15%
Plastic Ducts		53%
Aluminum Ducts		33%
Damper Present		77%
Number of Units		62

To increase efficiency, auditors recommended that ventilation should be reevaluated for 19 percent of the units, that 13 percent of the units should be cleaned, and that 13 percent should be replaced (3 percent now, 10 percent in the future).

Oven Ranges. All of the households in the survey had at least one oven range. A small number of households in the survey had oven ranges over 50 years old, shifting the mean age of oven ranges to an age slightly higher than expected. The auditors found most ranges in fair to very good condition.

The majority of oven ranges in the survey were fueled by electricity (approximately 59 percent), with the second most commonly used fuel being liquid propane (27 percent). Approximately 11 percent used natural gas, and 4 percent used other fuels (including wood).

Energy efficiency opportunities were noted for 28 percent of the oven ranges in the survey. Replacement was suggested for 11 percent of the units (3 percent immediately, 8 percent sometime in the future).

Humidifiers. Humidifiers were present in 18 percent of survey participants' homes in the onsite survey. Auditors recorded presence, use, and reasons for use of humidifiers during the survey.

Humidifier Operation During the Heating Season. Fourteen onsite survey participants (20 percent of the total) indicated that they had humidifiers in their homes. Of these, four participants indicated that their unit or units operate continuously, while the other 10 participants indicated that their units operate intermittently.

Reasons for Humidifier Use. Of the fourteen onsite survey participants who had humidifiers in their homes, 11 indicated that they used their units because their homes were very dry. Of these 11 respondents, 7 indicated that the reason their home was very dry specifically as a result of their use of a woodstove in the home.

Dehumidifiers. Twenty-nine percent of onsite survey participants had at least one dehumidifier in their homes. Auditors recorded presence, use, and reasons for use of dehumidifiers during the onsite survey.

Dehumidifier Operation During the Cooling Season. Nineteen onsite survey participants (27 percent of the total) indicated that they had dehumidifiers in their homes. Of these, 7 participants indicated that their unit or units operate continuously, while the other 12 participants indicated that their units operate intermittently.

Reasons for Dehumidifier Use. All 19 respondents who use a dehumidifier or dehumidifiers in their homes indicated that their reason for doing so was to keep the home dry and comfortable. Of these, 16 respondents indicated that they were using dehumidifiers specifically to keep their basements dry and comfortable.

8.3.3 Energy Savings Opportunities

Potential savings from early retirement. Table 8-12 showed that there are a great many appliances currently in service that were purchased prior to the promulgation of current federal standards and ENERGY STAR specifications, as well as a great many that are older than their engineering useful lives. These findings suggest that significant energy savings could be captured through an appliance recycling program. Appliance recycling programs were fairly common in the early years of utility-sponsored demand-side management. The gross energy savings from these programs can be very high, especially where they result in removal of old appliances used as spares. Even accelerating replacement of a 15 year-old refrigerator used as

the primary unit can result in significant savings – in the range of 500 – 700 kWh per year. Recent evaluations have found that these refrigerator and freezer recycling programs have net-to-gross ratios in the range of 50 to 60 percent. The reduction of effects is attributed to a number of factors: customer-reported plans to discard the appliances without the program, or intermittent use of the appliance prior to the program.[1]

Table 8-12
Population and Unit Energy Savings for Appliance Recycling

	Primary Refrig.	Second Refrig.	Freezer	Clothes Washer	Dish-washer
Pct. purchased since relevant federal minimum standard	44%*	100%	5%	43%	39%
Pct older than engineering useful life	11.6%	56.6%	48.2%	21.6%	22.6%
Metered UEC of old units removed for recycling	2,148 kWh/Yr	2,148 kWh/Yr	2,058 kWh/Yr		n/a
Unit savings based on standards research (no efficiency degrade)	695 kWh/Yr	n/a	410 kWh/Yr	246 kWh/Yr	108 kWh/Yr
Unit savings from replacement or removal (2nd refrigerators only)	1,203 kWh/Yr	2,148 kWh/Yr	1,588 kWh/Yr	246 kWh/Yr	108 kWh/Yr
# units in the population	288,159	49,000	158,487	276,632	155,606
Number of Units for which recycling program is applicable	33,426	49,000	76,391	n/a	n/a
Pct sample units for which immediate replacem't rec'd.	22%	n/a	23%	10%	11%

* Refers to 1993 federal minimum standard, superceded in 2001.

As Table 8-12 shows, only refrigerators and stand-alone freezers offer a sufficient number of very old units, as well as large gross unit energy savings needed to justify a recycling program. Assuming that all second refrigerators are at least 10 years old, all of them would fall in the targeted market for a recycling program. Based on the age distribution for all refrigerators, we estimate that early replacement of an additional 33,426 primary refrigerators would generate substantial savings. Finally, there are over 76,000 freezers that have been in service longer than their useful lives. These would be very good candidates for accelerated replacement.

The assumptions and sources used in compiling Table 8-12 are as follows.

[1] See XENERGY Inc. (1998). *Impact Evaluation of the Spare Refrigerator Recycling Program Final Report.* Prepared for Southern California Edison, San Dimas CA.

- ***Useful Lives.*** Twelve years for dishwashers and air conditioners; 14 years for refrigerators and clothes washers.[2]
- ***Metered UEC for Old Units.*** The source for the refrigerator and freezer estimates is a study of metered use of units picked up for recycling.[3] The washer estimate was developed using reported results of the "Bern" study of in-situ clothes washer energy and water consumption and calculation procedures used by EVT to estimate measure savings.[4]
- ***Savings for replacement or removal.*** We assume that all primary appliances removed by a recycling program will be replaced by new, standard efficiency models. We assume that second refrigerators will be removed and not replaced. The refrigerator configuration used to estimate savings is a 22 cubic foot top mounted model. The configuration for the freezer is a standing model with a 23 cubic foot capacity – the weighted average of AHAM shipments.
- ***Applicable units.*** The number of applicable units is the product of the following: number of households, average number of units installed in the sample households, and percentage of units older than their engineering useful lives.
- ***Percentage of units for which immediate replacement was recommended.*** The energy auditors were asked to make energy saving recommendations in regard to each appliance inventoried. Immediate replacement was among the measure options they could record.

ENERGY STAR Freezer Promotion. The Department of Energy is currently considering adding stand alone freezers to the roster of products eligible to receive the ENERGY STAR label. The Department of Energy has approached the two manufactures that account for all units produced in the U. S. (Frigidaire and WC Wood) concerning the development of an ENERGY STAR specification that would likely be 10 percent more efficient than the current federal standard. This would result in unit energy savings of 40 – 60 kWh per year for the most common sized models. At the moment, no models meeting the these efficiency specifications are on the market. The relatively modest levels of energy savings available with current compressor, insulation, and motor technology would not support an incentive program. However, freezer shipments have been rising recently and, should the ENERGY STAR specification be promulgated, it may be worthwhile to support freezers as part of the EPP.

[2] Koomey, Jonathan et al. (1998). *Projected Regional Impacts of Appliance Efficiency Standards for the U.S. Residential Sector*. Berkeley, CA, Lawrence Berkeley National Laboratory.

[3] Athens Research. (1996). *Refrigerator/Freezer UEC Estimation: 1996 ARCA/SCE Turn-in Program.*

[4] J. J. Tomlinson and D. T. Rizy, (1998). *Bern Clothes Washer Study: Final Report.* Oak Ridge National Laboratory for the U. S. Department of Energy, Oak Ridge, TN.

Other potential savings from appliances. Table 8-13 displays other recommendations that auditors made in regard to reducing energy use in appliances. These recommendations yield very modest savings and refer to relatively few units.

Table 8-13
Other Auditor Recommendations to Increase Appliance Energy Efficiency

Appliance and Recommendation	% of Appliances
Dishwasher (N=38)	
Lower temperature	3%
Clothes Dryer (N=62)	
Vent Properly	19%
Clean Unit	13%
Room Air Conditioner (N=25)	
Clean Unit	12%

8.4 LIGHTING

8.4.1 Saturation of Fixtures, Bulbs, and Efficient Technology

Table 8-14 summarizes the lighting inventory of lighting and fixtures and bulbs in the sample homes. The key findings from the inventory are as follows.

- ***Total bulbs and fixtures.*** Auditors recorded 2,143 fixtures and 2,803 bulbs in the sample homes. This was an average of 30.6 fixtures and 39.4 bulbs per house. Ninety-two percent of the fixtures and 93 percent of the bulbs were located in interior spaces, the remainder were located outside the homes.
- ***Distribution by location.*** The bedrooms accounted for 26 percent of all fixtures and 25 percent of all bulbs. Other well-lighted rooms included living rooms and kitchens.

Table 8-14
Lighting Fixtures and Bulbs Installed in Sample Homes

Room	FIXTURES		BULBS	
	Average #/Room	Percent CFL	Average #/Room	Percent CFL
Bedroom	2.41	0.2%	2.97	2.6%
Hallway	1.57	0.0%	1.96	5.2%
Bathroom	2.07	1.1%	3.26	3.8%
Living Room	2.91	0.4%	3.59	6.9%
Kitchen	2.90	3.3%	3.88	8.7%
Dining Room	1.96	3.4%	3.80	4.7%
Other Interior Rooms	2.78	3.2%	3.54	7.1%
Total per Interior Room	**2.43**	**1.6%**	**3.21**	**5.4%**
Exterior	2.27	0.6%	2.64	10.8%
Total per House	**30.56**	**1.5%**	**36.73**	**5.8%**

- ***Saturation of compact fluorescent fixtures.*** Fifteen percent of the 71 sampled houses contained fixtures specifically designed for pin-based compact fluorescent lamps. Of the 2,143 fixtures that auditors recorded, 32 or 1.5 percent were CFL models. Only one of these compact fluorescent fixtures was located outdoors. The most common location for compact fluorescent fixtures was the kitchen, which accounted for nearly 25 percent of the compact fluorescent fixtures installed.
- ***Saturation of compact fluorescent bulbs.*** Forty-nine percent of the homes in the sample had at least one compact fluorescent bulb installed, including pin-based bulbs installed in compact fluorescent fixtures. Auditors recorded a total of 162 CFL bulbs in the sample homes, an average of 2.3 per home. Among homes with any CFL bulbs installed, the average number installed was 4.6. These saturation numbers are considerably higher than the results of the 1998 Northeastern regional baseline study, which found that 30 percent of respondents to a telephone survey had CFLs installed, with an average of 2.35 bulbs per CFL user.[5] The most common locations for CFLs were exterior fixtures, kitchens, and living rooms.

[5] Opinion Dynamics Corporation. (1998). *Baseline Study of the Northeastern Residential Lighting Market,* Northeast Energy Efficiency Partnerships, Inc.

Locations of Purchase for Compact Fluorescent Light Bulbs and Fixtures

Survey respondents who purchased CFL bulbs and fixtures were asked to indicate where they purchased their CFL products.

CFL Bulbs. Of the 35 respondents who had CFL bulbs in their homes, 26 were able to recall where they purchased these products. Approximately 31 percent indicated that they purchased CFL bulbs at hardware stores, and an additional 19 percent purchased their CFL bulbs at discount retail stores such as Wal-Mart. Stores in the "other" category were each mentioned only once and include buying clubs (i.e., B.J.'s Wholesale), home centers (i.e., Home Depot), lighting supply stores, mail order catalogs, state promotion, Vermont Electric Co-Op, utility programs, and local promotions. Additional detail is provided in Table 8-15.

Table 8-15
CFL Bulb Purchase Locations Among Survey Participants

CFL Bulb Purchase Location	Frequency	% of Total
Hardware Store	8	31%
Discount Retail Store	5	19%
Other	13	50%
Number of Respondents	**26**	**100%**

CFL Fixtures. Of the 11 survey participants who had CFL fixtures in their homes, only 3 were able to indicate where they purchased their fixtures; two at discount retail stores, and one at a home center.

Lighting Controls

Auditors found that that vast majority of spaces contained only on/off switches: just 2% of the rooms surveyed contained dimmer switches and less than 1% had motion detectors.

Lighting Efficiency Opportunities

Given the broad objectives of the on-site survey, auditors did not have sufficient time to record information that would support precise estimates of the remaining potential for lighting retrofits in the sample homes. This would have required recording more detail on the configuration of each fixture (e.g. decorative, recessed can, open bulb) as well as estimates of hours of use. However, auditors were asked to record recommendations for improved lighting efficiency based on their observations in the home. For both indoor and outdoor lighting, auditors recommended replacing incandescent bulbs with compact fluorescents to 58 percent of onsite survey participants, and recommended that 8 percent of participants update or change their light fixtures to more efficient models.

Clearly, the relatively low penetration of compact fluorescent fixtures and bulbs suggests that significant potential remains. We also note that 61 percent of all survey respondents had ceiling fans installed and that more than half of these individuals had more than one ceiling fan installed. This suggests energy savings opportunities for replacements or new units that are designed to use compact fluorescent lamps. In 2002, EVT added such models to the list of fixtures eligible for incentives.

A

QUESTIONNAIRES AND INTERVIEW GUIDES

A.1 APPLIANCE MYSTERY SHOPPER SURVEY

Mystery Shopper Protocol:
Appliances

Store ID: _____
Store Name: _____
Store Address: _____
Date of Shop: _____
Name of Shopper: _____

This document contains the guidelines for completing the survey along with the survey form itself. The guidelines contain the sequence of activities to be carried out during the shop as well as scripts for engaging the sales people. The results of your shop are to be entered on the survey form.

You will collect display and point-of-purchase information for *all four* appliances. In addition, you will only be shopping (i.e., talking to sales staff) for *two* of the following four appliances:

__ Clothes Washer
___ Refrigerator
___ Dishwasher
___ ~~Room Air Conditioner~~ (unlikely to be stocked by Vermont stores in March)

Point-of-Purchase Materials

Enter the store and go to the appliance section. Observe the Energy Star point of purchase advertising. Note which appliances are advertised and the type of material (banner, flyer, poster, booklet, brochure, etc.). Note where the information is displayed, whether it is easy to see and read, and whether the display is attractive.

1. Were there any **Energy Star** point-of-purchase (POP) materials on display for the following appliances? (Please check if Yes)

   ____ Refrigerator
   ____ Clothes Washer
   ____ Dishwasher
   ____ Room Air Conditioner

If POP materials exist for at least one product then continue onto Question 2. Else skip to "Shopping" section.

2. What types of **Energy Star** point-of-purchase materials? (CHECK ALL THAT APPLY)

A. Appliance: Note which appliance the Energy Star POP material applies to.

B. Material type: Banners, Flyers/brochures, Posters, Videos, Stickers/Magnets/Cards, Milk carton/plate, Rebate forms, or Other (describe)

C. Description: Please note the sponsor, message, mention of rebates, any other significant features

A. Appliance	B. Material Type	C. Description

3. Please indicate the extent to which you agree with the following statements on a scale of 1 to 10, with a "1" meaning "strongly disagree" and a "10" meaning "strongly agree".

   A. For "easy to see", consider: presence of other materials, distance, height with respect to eye level, direction material is facing, how it catches attention, etc.

   B. For "easy to understand", consider: ease of reading, brevity, how well the message is delivered, etc.

   C. For "nicely displayed", consider: use of colors, font size, condition of material, etc.

Statement	Refrigerator	Clotheswasher	Dishwasher	Room Air Conditioner
A. The Energy Star point-of-purchase materials were easy to see				
B. The Energy Star point-of-purchase materials were easy to understand				
C. The Energy Star point-of-purchase materials were nicely displayed				

Shopping - Sales Staff Interaction

At the beginning of this form, two appliances are checked off - you will be shopping for these two appliances at the store. When approached by a sales person, explain that you are shopping for the two appliances. For example, say: "I'm shopping for a dishwasher and a refrigerator."

For each appliance, the sales person will probably ask what features you are interested in. Below, we provide the following information for each of the appliances that you might be shopping for. You should ***always*** describe the appliances you are shopping for using these descriptions. If they ask you what your price range is, tell them that you are not sure, and you'd just like to examine several models that they'd recommend.

Dishwasher
Ask for a white standard size dishwasher.

Clotheswasher
Ask for a white washer, standard size (i.e., not greater than 3 cubic feet).

Refrigerator
Ask for a white 22 cubic foot refrigerator with either a top or side freezer and no ice in the door. There can be an ice maker inside the freezer portion.

As the sales person shows you the models, note whether he/she mentions energy use, energy efficiency, rebates, lifecycle costs, second price tag, etc. and what he/she says regarding energy use, energy efficiency, rebates, lifecycle costs, second price tag, etc.

If shopping for an appliance with the **EnergyGuide** label on it, say: "Can you explain the EnergyGuide label to me?"

Also, note whether the Energy Star label is on the appliance or on a card placed on the appliance. If the **Energy Star** label is present and the sales person has not mentioned the Energy Star label, ask: "What does the Energy Star label mean?"

If they *do not* mention energy use or energy efficiency, say: "Do all of these models use the same amount of electricity?" If, after raising the energy efficiency issue, he/she offers to show you more models, allow them to do so.

At the end of the discussion, ask: "Do you think it is worth it to buy a higher efficiency model?" Record their response.

5. How many units did the sales person *initially* show you? (Enter number)

____ Refrigerator
____ Clothes Washer
____ Dishwasher

6. Of the units that you were *initially* shown, how many were voluntarily described by the sales person as being "energy efficient"? (Enter number)

____ Refrigerator
____ Clothes Washer
____ Dishwasher

7a. Of the units that you were *initially* shown, how many had the Energy Star label, magnet, card, plate, or milk carton? (Enter number)

____ Refrigerator
____ Clothes Washer
____ Dishwasher

7b. If any of the models shown have the EnergyGuide label (large black-yellow label) and the salesperson has not discussed it, ask him/her to explain it. Record their response. Note if they voluntarily described it.

7c. If any of the models shown have the Energy Star label or card (per question 7a) and the salesperson has not discussed it, ask him/her to explain it. Record their response. Note if they voluntarily described it.

If NO models are described by the sales person as being energy efficient (per Question #6 above), then continue onto Question #8.
Otherwise skip to Question #12.

8. Ask "Do all of these models use the same amount of electricity?"
   How many of the units *initially shown* to you were *now* described by the sales person as being "energy efficient"?
   ____ Refrigerator
   ____ Clothes Washer
   ____ Dishwasher

9. After you explicitly asked the sales person about energy efficiency (in question #8), how many *additional units* did the sales person show you?
   ____ Refrigerator
   ____ Clothes Washer
   ____ Dishwasher

If Question #9 = YES for at least one product then continue for that product.
ELSE SKIP TO QUESTION 12

10. Of the *additional units* that you were shown, how many were described by the sales person as being "energy efficient"?
    ____ Refrigerator
    ____ Clothes Washer
    ____ Dishwasher

11a. Of the *additional units* that you were shown, how many had the Energy Star label, magnet, card, plate, or milk carton?

    ____ Refrigerator
    ____ Clothes Washer
    ____ Dishwasher

11b. If any of the additional units shown have the Energy Star label or card and the salesperson has not discussed it already, ask what this label means. Record their response. Note if they voluntarily described it.

11c. Note any changes in the behavior, attitude, or type of information discussed by the sales person after asking about electricity usage in Question #8.

12. Please indicate the extent to which the sales person was knowledgeable about energy efficiency. Record your answer on a scale of 1 to 10, with a "1" meaning "Not at all knowledgeable" and a "10" meaning "Very knowledgeable". Consider: mentions of key energy efficiency related terms, general understanding of concepts, etc.
If you had to ask salesperson about electricity usage in Question #8, please rate salesperson before and after asking question.

Appliance	Pre-Q8	Post-Q8
Refrigerator	_____	_____
Clothes Washer	_____	_____
Dishwasher	_____	_____

12. Please indicate the extent to which the sales person mentioned energy efficiency as a *positive feature* in his/her sales pitch. Record your answer on a scale of 1 to 10, with a "1" meaning "Not at all" and a "10" meaning "A great deal". Consider: emphasis on energy efficiency or electricity savings as a product benefit, etc.
If you had to ask salesperson about electricity usage in Question #8, please rate salesperson before and after asking question.

Appliance	Pre-Q8	Post-Q8
Refrigerator	_____	_____
Clothes Washer	_____	_____
Dishwasher	_____	_____

12. Please indicate the extent to which the sales person appeared knowledgeable about the *Energy Star Program*. Record your answer on a scale of 1 to 10, with a "1" meaning "Not at all knowledgeable" and a "10" meaning "Very knowledgeable". Consider: mention of Energy Star, what labels mean, who sponsors, etc.
If you had to ask salesperson about electricity usage in Question #8, please rate salesperson before and after asking question.

Appliance	Pre-Q8	Post-Q8
Refrigerator	_____	_____
Clothes Washer	_____	_____
Dishwasher	_____	_____

12. (Clothes Washers Only) Please indicate the extent to which the sales person appeared knowledgeable about the *Efficiency Vermont* rebate programs for Energy Star clothes washers. Record your answer on a scale of 1 to 10, with a "1" meaning "Not at all knowledgeable" and a "10" meaning "Very knowledgeable". Consider: mention of clothes washer rebate, Efficiency Vermont, how rebate process works, etc.

If you had to ask salesperson about electricity usage in Question #8, please rate salesperson before and after asking question.

	Pre-Q8	Post-Q8
Clothes Washer	_____	_____

12. In discussing energy efficiency, which of the following did the sales person mention? If you had to ask salesperson about electricity usage in Question #8, please note whether term was mentioned before or after asking question.

Statement	Refrigerator	Clotheswasher	Dishwasher
Annual operating costs			
Payback period			
Lifecycle costs			
Lifecycle savings			
"Second price tag"			
Lower utility bills			
Reliability of the products			
Energy Star			
EVT rebates			
Manufacturer rebates			
Store rebates			
Other:			

17. Record below the response of the sales person to the question: "Do you think it is worth it to buy a higher efficiency model?"

Refrigerator	
Clothes Washer	
Dishwasher	

Problem Situations

There are three problems that may arise during your shopping. The first is that the store may not stock the equipment you are supposed to be shopping for. The second is that you may not be able to get the attention of the sales person. The third is that the store manager may question you about your reason for being in the store.

Stocking Problems

In this study, we are interested in the following equipment:

1. refrigerators,
2. dishwashers,
3. clothes washers

You are being asked to shop for two appliances. However, it is possible that the store might not stock one of two the appliances that you are supposed to be shopping for. If this happens, replace the equipment they don't have with another that they do have.

Sales Person Attention

In some stores, you may encounter some difficulty in getting the sales person to spend the time showing you the equipment that you are shopping for. First, you should be persistent and patient. If you still are have trouble in getting their attention, you should go to the store manager and tell him or her that you need assistance.

Store Manager Questions

If the store manager or other store staff become suspicious and start asking questions about what you are doing in their store, simply tell them that you are comparison shopping. If they persist, try to continue the shop as best as you can. Please try to complete the shop. Note on the questionnaire that you encountered a problem with the store manager, how you handled it, at what point in your shop the problem occurred, and whether you were able to complete the shop.

Appliance Model Information

First Appliance: For the models shown to you by the salesperson, record the: manufacturer name, model name, model number, size, features, price (without rebate), rebate amount (if any), rebate sponsor, and Energy Star status, and whether the unit was shown to you after asking about energy efficiency (per question #8).

First Appliance Type: _____

	Unit #1	Unit #2	Unit #3
Manufacturer			
Model Name			
Model Number			
Size			
Features			
Price (w/o rebate)			
Rebate Amount			
Rebate Sponsor			
Energy Star Qual?			
Shown after asking about EE?			

	Unit #4	Unit #5	Unit #6
Manufacturer			
Model Name			
Model Number			
Size			
Features			
Price (w/o rebate)			
Rebate Amount			
Rebate Sponsor			
Energy Star Qual?			
Shown after asking about EE?			

Second Appliance: For the models shown to you by the salesperson, record the: manufacturer name, model name, model number, size, features, price (without rebate), rebate amount (if any), rebate sponsor, and Energy Star status, and whether the unit was shown to you after asking about energy efficiency (per question #8).

Second Appliance Type: _____

	Unit #1	Unit #2	Unit #3
Manufacturer			
Model Name			
Model Number			
Size			
Features			
Price (w/o rebate)			
Rebate Amount			
Rebate Sponsor			
Energy Star Qual?			
Shown after asking about EE?			

	Unit #4	Unit #5	Unit #6
Manufacturer			
Model Name			
Model Number			
Size			
Features			
Price (w/o rebate)			
Rebate Amount			
Rebate Sponsor			
Energy Star Qual?			
Shown after asking about EE?			

A.2 APPLIANCE RETAILER SURVEY

VERMONT EFFICIENT PRODUCT STUDY
APPLIANCE RETAILER INTERVIEW GUIDE

IDENTIFICATION
Contact Name: _____
Company: _____
Location Address: _____
City, State, Zip: _____
Telephone: _____
Survey ID Number: _____

Lead in:

Hello, this is _____ calling from XENERGY Inc. We are conducting a study on appliances sold in retail establishments for the Vermont Department of Public Service and Efficiency Vermont.

Identification of Respondent

May I speak with [CONTACT NAME] or the manager of the store (or appliance department).

IF NEITHER THE CONTACT NOR THE MANAGER IS AVAILABLE, ASCERTAIN BEST TIME TO CALL.

Lead in for respondent.

Hello, this is _____ calling from XENERGY Inc. We would like to ask you a few questions concerning the appliances your store sells – it will take about 10-15 minutes. The study is being conducted for the Vermont Department of Public Service and Efficiency Vermont. All answers you provide will be held in confidence.

SCREENER

SR1. Does your store carry any of the following? CIRCLE ALL THAT APPLY.

ENERGY STAR qualified Refrigerators 1
ENERGY STAR qualified Dishwashers 2
ENERGY STAR qualified Clothes washers 3
ENERGY STAR qualified Room Air Conditioners 4

[ENERGY STAR Appliances: These appliances meet the energy efficiency standards of the ENERGY STAR program, which is run by DOE & EPA]

IF NO RESPONSES TO SR1 CIRCLED, THEN ASK SR2. ELSE ASK SR3

SR2. What are the main reasons your store does not carry Energy Star appliances?

THANK & TERMINATE

.

SR3. Do you have primary responsibility for stocking and sales of appliances in this store?

Yes 1
No 2

IF YES, GO TO DE1.

IF NO, May I have the name and title of the person in this store who has primary responsibility for stocking and sales of appliances in this store?

ENTER NAME:_____
ENTER TITLE: _____

ASK TO BE TRANSFERRED TO THE PERSON ABOVE TO CONTINUE THE INTERVIEW.

REPEAT LEAD-IN AS NECESSARY.

DECISION MAKING

DE1. First, which of the following categories does your store fall into?

Branch of a national chain (Sears, etc.) 1
Branch of a state or regional chain 2
Independently-owned store with coop affiliation 3
Independent without a regional or national affiliation 4

DE1A. Do you use a buying group?

Yes (name: _____) 1
No 2

IF DE1 = 4 SKIP TO NEXT SECTION, ELSE ASK DE2.

DE2a. Which of the following parties are involved in decisions concerning which appliances to carry: your store manager, the appliance department manager, a committee of store or department managers, chain or coop staff, or manufacturer representatives?

IF MORE THAN ONE REPSONSE GIVEN FOR DE2a, ASK DE2b. ELSE ASK DE3a.

DE2b. Which of these parties has the most influence on which products to carry? [ACCEPT ONE ONLY.]

DE3a. Which parties are involved in decisions regarding stocking and display of specific appliances?

DE3b. IF MORE THAN ONE MENTION IN DE3a. Which party has the most influence on these decisions? [ACCEPT ONE ONLY.]

DE4a. Which parties participate in decisions regarding pricing and promotion of appliances?

Answer Grid for DE2 - DE4

	DE2a	DE2b	DE3a	DE3b	DE4a
Local store manager	1	1	1	1	1
Local appliance dept. mgr.	2	2	2	2	2
Committee of managers	3	3	3	3	3
Buyers for chain/coop	4	4	4	4	4
Manufacturers	5	5	5	5	5

DE5. Approximately what percent of total appliance sales are purchased by the following groups of customers: (Ask for best estimate)

Residential customers/homeowners ____
Small businesses ____
Property managers for rental housing ____
Builders/remodelers ____
Other? ____
.....Total should be roughly 100%

Stocking and Sales Patterns: Refrigerators

[Ask this sequence only if the store carries ENERGY STAR Refrigerators (SR1=1). Else skip to next section.]

RF1. Approximately how many refrigerator models do you currently display on your floor?

ENTER NUMBER OF MODELS.....____

RF4. Of your current floor display, what percent of refrigerator models qualify for the ENERGY STAR label?

ENTER PERCENT OF MODELS.....____

RF5a. Has this percentage of EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

RF5b. What factors have caused the stocking of EnergyStar qualified models to increase/decrease?

RF6a. Approximately how many refrigerators were sold by your store this past year?

ENTER NUMBER (OR RANGE IF REFUSE TO GIVE #) _____

RF7a. About what percentage of these refrigerator sales were ENERGY STAR qualified models? (Probe for estimate)

ENTER PERCENTAGE ..... _____

RF7b. Have sales of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

RF7c. What factors have caused the sales of EnergyStar qualified models to increase/decrease?

Stocking and Sales Patterns: Dishwashers

Ask this sequence only if the store carries ENERGY STAR Dishwasher (SR1=2). Else skip to next section.

DW1. Approximately how many dishwasher models do you currently display on your floor?

ENTER NUMBER OF MODELS ..... ____

DW4. Of your current floor display, what percent of dishwasher models qualify for the ENERGY STAR label?

ENTER PERCENT OF MODELS ..... ____

DW5a. Has this percentage of EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

DW5b. What factors have caused the stocking of EnergyStar qualified models to increase/decrease?

DW6a. Approximately how many dishwashers were sold by your store this past year?

ENTER NUMBER (OR RANGE IF REFUSE TO GIVE #) _____

DW7a. About what percentage of these dishwasher sales were ENERGY STAR qualified models? [Probe for estimate]

ENTER PERCENTAGE ..... _____

DW7b. Have sales of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

DW7c. What factors have caused the sales of EnergyStar qualified models to increase/decrease?

Stocking and Sales Patterns: Clothes washers

Ask this sequence only if the store carries EnergyStar Clothes washers (SR1=3). Else skip to next section.

CW1. Approximately how many clothes washer models do you currently display on your floor?

ENTER NUMBER OF MODELS ..... ____

CW4. Of your current floor display, what percent of clothes washer models qualify for the ENERGY STAR label?

ENTER PERCENT OF MODELS ..... ____

CW5a. Has this percentage of EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

CW5b. What factors have caused the stocking of EnergyStar qualified models to increase/decrease?

CW6a. Approximately how many clothes washers were sold by your store this year?

ENTER NUMBER (OR RANGE IF REFUSE TO GIVE #) _____

CW7a. About what percentage of these clothes washer sales were ENERGY STAR qualified models? [Probe for estimate]

ENTER PERCENTAGE ..... _____

CW7b. Have sales of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

CW7c. What factors have caused the sales of EnergyStar qualified models to increase/decrease?

Stocking and Sales Patterns: Room Air Conditioners

Ask this sequence only if the store carries ENERGY STAR Room Air Conditioners (SR1=4). Else skip to next section.

AC1. Approximately how many room air conditioner models do you currently display on your floor?

ENTER NUMBER OF MODELS.....____

AC4. Of your current floor display, what percent of air conditioner models qualify for the ENERGY STAR label?

ENTER PERCENT OF MODELS .....____

AC5a. Has this percentage of EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

AC5b. What factors have caused the stocking of EnergyStar qualified models to increase/decrease?

AC6a. Approximately how many room air conditioners were sold by your store this year?

ENTER NUMBER (OR RANGE IF REFUSE TO GIVE #) _____

AC7a. About what percentage of these air conditioner sales were ENERGY STAR qualified models? [Probe for estimate]

ENTER PERCENTAGE ..... _____

AC7b. Have sales of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

AC7c. What factors have caused the sales of EnergyStar qualified models to increase/decrease?

Customer Perceptions

CP1. From the customer's point of view, what do you think are the key advantages or selling points of ENERGY STAR qualified appliances? CIRCLE ALL THAT ARE MENTIONED.

- Lower operating costs 1
- Lower life-cycle costs 2
- Less environmental damage / more enviro. friendly 3
- Better performance 4
- Longer life/convenience of infrequent replacement 5
- Energy savings 6
- Bundling with other premium features 7
- Other (Specify) _____ 8

CP1a. What are the disadvantages or negative features for the customer? CHECK ALL MENTIONED.

CP1b. Which of these has the strongest influence in discouraging customers from purchasing ENERGY STAR qualified appliances? CHECK ONE ONLY.

	CP1a	CP1b
High price	1	1
Uncertainty about energy savings	2	2
Lack of availability in certain types/size/styles	3	3
Lack of availability for certain manufacturers	4	4
Other (Specify)	8	8

CP2a. Which do you think is more important to the typical customer who purchases an Energy Star qualified appliance? [READ LIST]

The energy savings and operating cost savings OR 1
The premium features that usually come with the Energy Star model 2

CP2b. Does this apply more often to certain appliance types than others? Which ones?

CP3. Over the past year, do you think that customer demand for ENERGY STAR qualified appliances has:

- Increased 1
- Decreased 2
- Stayed the same 3

CP3a. Specifically, which types of appliances?

CP4. Why do you think customer demand has changed?

CP5a. Compared to standard efficiency appliances, do you think that customers are more or less satisfied with Energy Star qualified models?

More..... 1
Less..... 2
Same..... 3
Don't Know..... 4

CP5b. Why do you say this? [Probe number of complaints, returns, etc.]

Retailer Perceptions

SF1a. From your store's point of view, what are the barriers or disadvantages to the further stocking and promotion of ENERGY STAR qualified appliances?

SF1b. What's the most important?

SF2a. What are the benefits to your store in stocking and promoting ENERGY STAR qualified appliances?

SF2b. What's the most important?

SF3a. How important is stocking and promoting ENERGY STAR qualified appliances to the overall business goals of your store? On a scale of 1 to 10, where 1 is not at all important and 10 is very important, how would you rate the importance of Energy Star qualified appliances?

IF SF3a > 4, ASK SF3b. ELSE ASK SF4.

SF3b. In what ways do you think selling ENERGY STAR qualified appliances is important to your store's overall business goals? [Important question: Probe for responses]

SKIP TO TR1

SF4. Why do you think that selling ENERGY STAR qualified appliances is not important to your store's overall business goals? [Important question: Probe for responses]

Training

TR1. Has any staff at this store received training to support sales of ENERGY STAR appliances?

- Yes 1
- No 2
- Don't know 3

IF TR1 = 1, ASK TR2. ELSE SKIP TO TR8.

TR2. What organizations provided this training?

- Manufacturers 1
- Utility program contractors 2
- Efficiency Vermont 3
- Utilities 4
- Store staff/managers 5
- Corporate staff/managers 6
- Professional or trade organizations 7
- Other (Specify:_____) 8

TR3. Over the past year, how many training sessions or programs were provided?

ENTER NUMBER OF SESSIONS ..... _____

TR4. Approximately how many employees have attended these training sessions?

ENTER NUMBER OF EMPLOYEES ..... _____

TR4a. What categories of employees have gone through training on energy-efficient appliance products?

- Appliance department sales staff 1
- Department managers 2
- Cashiers 3
- Store manager 4
- Other (Specify: _____) 5
- Don't know 6

TR5. What topics were covered in these sessions? [PROMPT IF NECESSARY.]

- Technical performance of ENERGY STAR appliances 1
- Appropriate applications for ENERGY STAR appliances 2
- Advantages/selling points for ENERGY STAR appliances 3
- How to overcome objections to price 4
- ENERGY STAR product specifications, program operations 5
- Program operations 6
- Other (Specify: _____) 7
- Don't know 8

TR6. How effective were these training programs in helping your employees sell ENERGY STAR appliances? Would you say they were…

- Very effective 1
- Somewhat effective 2
- Not very effective 3
- Not at all effective 4
- Don't know 5

IF TR6 = 3 OR 4, ASK TR7. ELSE SKIP TO NEXT SECTION.

TR7. What changes to the training sessions would have made them more effective?

TR8a. How does your staff acquire information and become educated about Energy Star appliances?

TR8b. What types of information do they acquire on Energy Star appliances? (i.e., product benefits, how to sell product, etc.)

Promotion and Advertising

BA1. Does this store do any media advertising for ENERGY STAR appliances?

- Yes 1
- No 2
- Don't know 3

IF BA1 = 1, ASK BA2. ELSE SKIP TO BA5.

BA2. During the past 12 months, which media have you used to advertise ENERGY STAR appliances? CIRCLE ALL THAT APPLY.

- Newspaper 1
- Magazines 2
- Radio 3
- TV 4
- Internet 5
- Unpaid media (press releases) 6
- Store circulars 7
- Other (Specify: _____) 8

BA3. During the past 12 months, how often, on average, have you run some kind of media advertisement for ENERGY STAR appliances?

- Daily 1
- At least once per week 2
- At least once per month 3
- At least once quarterly 4
- Less frequently 5
- Never 6
- Don't know 7

BA5. In the past 12 months have you undertaken any special price promotions, sales, or rebate programs for ENERGY STAR appliances?

- Yes 1
- No 2
- Don't know 3

IF BA5 = 1, ASK BA6. ELSE SKIP TO BA8.

BA6. Who provided the rebates or authorized discounts for these promotions or sales?

- Utility 1
- Manufacturers 2
- Corporate program 3
- Store-based initiative 4
- Efficiency Vermont 5
- Other (Specify: _____) 6

BA7a. Over the past year, on average, how often have price promotions or sales for ENERGY STAR appliances been in effect? Would you say it was …

- All the time 1
- At least one week per month 2
- At least one week per quarter 3
- Less frequently 4
- Don't know 5

BA8. Over the past year, has your store posted any in-store advertising for ENERGY STAR appliances, such as point of purchase displays?

- Yes 1
- No 2
- Don't know 3

IF BA8=1, ASK BA8a. ELSE SKIP TO EV1.

BA8a. What types of in-store advertising?

BA8b. For which products?

BA9. Over the past year, on average, how often have in-store advertising for ENERGY STAR appliances been up? Would you say it was…

- All the time 1
- At least one week per month 2
- At least one week per quarter 3
- Less frequently 4
- Don't know 5

Efficiency Vermont Appliance Program

EV1. Are you aware of Efficiency Vermont's program to promote the purchase of ENERGY STAR appliances? [The program offers mail-in rebates to customers for ENERGY STAR clothes washers as well as marketing support for retailers.]

Yes 1
No 2

IF EV1=1, ASK EV2. ELSE SKIP TO END.

EV2. Have you or someone at your store been approached by the program operator to participate in the program?

Yes 1
No 2
Don't know 3

EV3. Has your store enrolled in the program?

Yes 1
No 2
Don't know 3

IF EV3=2, ASK EV4. ELSE SKIP TO EV5.

EV4a. What is the main reason your store has not enrolled in the program?
EV4b. Are there other reasons?

THANK AND TERMINATE.

EV5a. What is the main reason you decided to enroll in the program?
EV5b. Were there other reasons?

EV6. On a scale of 1 to 5, where 5 is very good and 1 is very poor, how would you rate the following elements of the Efficiency Vermont program? ENTER 6 FOR DON'T KNOW.

a. Assistance with in-store promotion..... _____

b. Training for staff..... _____

c. Rebate processing ..... _____

EV7a. Why did you give each of the program elements these ratings…

a. How about Assistance with in-store promotion?

b. And Training for staff?

c. And Rebate processing?

EV8a. Has the Efficiency Vermont program influenced your *stocking* of EnergyStar appliances? How so?

EV8b. Has the program influenced your *promotion* of EnergyStar appliances? How so?

EV8c. Has the program influenced your *sales* of EnergyStar appliances? How so?

EV9. Do you have any suggestions to help improve the program? If so, what are your suggestions?

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.

A.3 LIGHTING RETAILER SURVEY

VERMONT EFFICIENT PRODUCT STUDY
LIGHTING RETAILER INTERVIEW GUIDE

IDENTIFICATION
Contact Name: _____
Company: _____
Location Address: _____
City, State, Zip _____
Telephone: _____
Survey ID Number: _____

Lead in:

Hello, this is _____ calling from XENERGY Inc. We are conducting a study on lighting equipment sold in retail establishments for the Vermont Department of Public Service and Efficiency Vermont.

Identification of Respondent

May I speak with [CONTACT NAME] or the manager of the store (or lighting department).

IF NEITHER THE CONTACT NOR THE MANAGER IS AVAILABLE, ASCERTAIN BEST TIME TO CALL.

Lead in for respondent.

Hello, this is _____ calling from XENERGY Inc. We would like to ask you a few questions concerning the lighting equipment your store sells – it should take about 10-15 minutes. The study is being conducted for the Vermont Department of Public Service and Efficiency Vermont. All answers you provide will be held in confidence.

SCREENER

SR1. Does your store carry any of the following? CIRCLE ALL THAT APPLY.

Screw-in compact fluorescent light bulbs for use in conventional incandescent fixtures 1

Portable lighting fixtures such as table or floor lamps designed for use with pin-based compact fluorescent bulbs..... 2

Ceiling or wall-mounted lighting fixtures designed for use with pin-based compact fluorescent bulbs..... 3

Exterior lighting fixtures designed for use with pin-based compact fluorescent bulbs 4

IF NO RESPONSES TO SR1 CIRCLED, ASK SR1a. ELSE SR2.

SR1a What are the main reasons your store does not carry compact fluorescent lighting products?

THANK & TERMINATE

SR2. Have you heard of ENERGY STAR labeled products?
Yes..... 1
No..... 2
Don't Know..... 7

IF SR2 = 2 or 3 read "The ENERGY STAR program labels consumer products that meet energy efficiency standards and is sponsored by the Department of Energy and Environmental Protection Agency."

SR3. Does your store carry ENERGY STAR models for the following products? ASK ONLY FOR PRODUCTS WHERE SR1 = "YES". CIRCLE ALL THAT APPLY.
ENERGY STAR screw-in compact fluorescent light bulbs..... 1
ENERGY STAR portable compact fluorescent lighting fixtures..... 2
ENERGY STAR hard-wired compact fluorescent lighting fixtures 3

SR4. Do you have primary responsibility for stocking and sales of lighting equipment in this store?
Yes..... 1
No..... 2

IF YES, GO TO DE1.

IF NO, May I have the name and title of the person in this store who has primary responsibility for stocking and sales of lighting equipment in this store?

ENTER NAME:_____
ENTER TITLE: _____

ASK TO BE TRANSFERRED TO THE PERSON ABOVE TO CONTINUE THE INTERVIEW.
REPEAT LEAD-IN AS NECESSARY.

DECISION MAKING

DE1. First, which of the following categories does your store fall into?

Branch of a national chain (Home Depot) 1
Branch of a state or regional chain 2
Independently-owned store with coop affiliation (Aubuchon) 3
Independent without a national affiliation 4

DE1a. Do you use a buying group?

Yes (name: _____) 1
No 2

IF DE1 = 4 SKIP TO NEXT SECTION, ELSE DE2a.

DE2a. Which of the following parties are involved in decisions concerning which lighting products to carry: your store manager, the lighting department manager, a committee of store or department managers, chain or coop staff, manufacturers or manufacturer representatives?

IF MORE THAN ONE REPSONSE GIVEN FOR DE2a, ASK DE2b. ELSE DE3a.

DE2b. Which of these parties has the most influence on which products to carry? [ACCEPT ONE ONLY.]

DE3a. Which parties are involved in decisions regarding stocking and display of specific lighting products?

DE3b. IF MORE THAN ONE MENTION IN DE3a. Which party has the most influence on these decisions? [ACCEPT ONE ONLY.]

DE4a. Which parties participate in decisions regarding pricing and promotion of lighting products?

Answer Grid for DE2 - DE4

	DE2a	DE2b	DE3a	DE3b	DE4a
Local store manager	1	1	1	1	1
Local lighting dept. mgr.	2	2	2	2	2
Committee of managers	3	3	3	3	3
Buyers for chain/coop	4	4	4	4	4
Manufacturers	5	5	5	5	5

DE5. Approximately what percent of lighting products are sold to the following groups of customers: [Ask for best estimate]

Residential customers/homeowners ____
Small businesses ____
Property managers for rental housing ____
Home Builders/Remodelers ____
Other? ____
.....Total should roughly equal 100%

STOCKING AND SALES PATTERNS: Screw-In CFLs

[Ask this sequence only if respondent indicates the store carries screw-in CFL bulbs. IF SR1= 1]

SL1. Of all light bulbs sold by your store last year – this includes incandescent, halogen, fluorescent tubes, and any other types - what percent were compact fluorescent models?
[Ask for best estimate]

ENTER PERCENTAGE

SL3. Approximately how many models of screw-in compact fluorescent light bulbs do you currently stock? [PROMPT IF NECESSARY: That is, models defined by manufacturer, wattage, and tube configuration.]

ENTER NUMBER OF MODELS.....____

SL4. Of your current stock, what percent of screw-in CFL models qualify for the ENERGY STAR label?

ENTER PERCENT OF MODELS.....____

SL5a. Has the stocking of these EnergyStar CFL models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

SL5b. What factors have caused the stocking of EnergyStar qualifying models to increase/decrease?

SL6. Approximately how many screw-in CFL bulbs were sold by your store this past year?

[Ask for best estimate]

ENTER NUMBER (OR RANGE IF REFUSE TO GIVE #) _____

SL7a. And about what percentage of these CFL sales were ENERGY STAR qualified models?

ENTER PERCENTAGE ..... _____

SL7b. Have sales of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

SL7c. What factors have caused the sales of EnergyStar qualified models to increase/decrease?

STOCKING AND SALES PATTERNS: Hardwired Fixtures

[Ask this sequence only if respondent indicates the store carries hard-wired Compact Fluorescent Fixtures. IF SR1= 3 or 4]

SC2. ? Of all hard-wired lighting fixtures sold by your store last year – this includes the standard screw-in models, fluorescent tube models, and any other types – about what percent were compact fluorescent models? By hard-wired CFL fixtures, we mean ceiling, wall, or exterior fixtures designed for use with pin-based compact fluorescent bulbs.

[Ask for best estimate]

..... ENTER PERCENTAGE ____

SC3. Approximately how many models of hardwired CFL fixtures do you currently stock?

ENTER NUMBER OF MODELS ..... ____

SC4. Of your current stock, what percent of hardwired CFL fixture models qualify for the ENERGY STAR label?

ENTER PERCENT OF MOD ..... ELS ____

SC5a. Has the stocking of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

SC5b. What factors have caused the stocking of EnergyStar models to increase/decrease?

SC6. Approximately how many hardwired CFL fixtures were sold by your store this past year?

ENTER NUMBER (OR RANGE IF REFUSE TO GIVE #) _____

SC7a. About what percentage of these hardwired CFL fixture sales were ENERGY STAR qualified models? [Ask for best estimate]

ENTER PERCENTAGE ..... _____

SC7b. Have sales of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

SC7c. What factors have caused the sales of EnergyStar qualified models to increase/decrease?

STOCKING AND SALES PATTERNS: Portable CFL Fixtures

[Ask this sequence only if respondent indicates the store carries portable CFL fixtures. IF SR1= 2]

SF2. Of all portable lighting fixtures sold by your store last year – this includes the standard screw-in models and any other types – about what percent were compact fluorescent models? By portable CFL fixtures, we mean table or floor lamps designed for use with pin-based compact fluorescent bulbs.
[Ask for best estimate]

ENTER PERCENTAGE .....___

SF3. Approximately how many models of portable CFL fixtures do you currently stock?

ENTER NUMBER OF MODELS.....____

SF4b. Of your current stock, what percent of portable CFL fixtures qualify for the ENERGY STAR label?

ENTER PERCENT OF MODELS.....____

SF5a. Has the stocking of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

SF5b. What factors have caused the stocking of EnergyStar qualified models to increase/decrease?

SF6. Approximately how many portable CFL fixtures were sold by your store this past year?

ENTER NUMBER (OR RANGE IF REFUSE TO GIVE #) _____

SF7a. About what percentage of these portable CFL fixture sales were ENERGY STAR qualified models? [Ask for best estimate]

ENTER PERCENTAGE ..... _____

SF7b. Have sales of these EnergyStar qualified models increased, decreased, or remained the same over the past year?

Increased 1
Decreased 2
Remained the same 3

SF7d. What factors have caused the sales of EnergyStar qualified models to increase/decrease?

CUSTOMER PERCEPTIONS

CP1. From the customer's point of view, what do you think are the key advantages or selling points of compact fluorescent lighting products, including both light bulbs and fixtures? CIRCLE ALL THAT ARE MENTIONED

Lower operating costs 1
Lower life-cycle costs 2
Longer life/convenience of infrequent replacement 3
Less environmental damage / more enviro. friendly 4
Light quality 5
Energy savings 6
Other (Specify) _____ 7

CP1a. What are the disadvantages or negative features for the customer? CHECK ALL MENTIONED.

CP1b. Which of these has the strongest influence in discouraging customers from purchasing energy efficient lighting products? CHECK ONE ONLY.

	CP1a	CP1b
High price	1	1
Limited number of styles	2	2
Doesn't work with dimmer switches	3	3
Doesn't have 3-way capability	4	4
Unsightly appearance	5	5
Cost of replacement lamps	6	6
Availability of replacement lamps	7	7
Poor light quality	8	8
Other (Specify)	9	9

CP2. Over the past year, do you think that customer demand for CFL light bulbs and fixtures has:

Increased 1
Decreased 2
Stayed the same 3

CP2a. Specifically, which products?

CP3. Why do you think customer demand has changed?

CP5a. Compared to standard lighting products, do you think that customers are more or less satisfied with compact fluorescent models?

More 1
Less 2
Don't Know 3

CP5b. Why do you say this? [Probe number of complaints, returns, etc.]

RETAILER PERCEPTIONS

RP1a. From your stores point of view, what are the barriers or disadvantages to the further stocking and promotion of ENERGY STAR qualified CFL products? This includes both light bulbs and fixtures.

RP1b. What's the most important?

RP2a. What are the benefits to your store in stocking and promoting ENERGY STAR qualified CFL products?

RP2b. What's the most important?

RP3a. How important is stocking and promoting ENERGY STAR qualified CFL products to the overall business goals of your store? On a scale of 1 to 10, where 1 is not at all important and 10 is very important, how would you rate the importance of Energy Star qualified CFL products?

IF RP3a >4, ASK RP3b. ELSE ASK RP4.

RP3b. Why do you think that selling ENERGY STAR qualified CFL products is important to your store's overall business goals? [Important question: probe for responses]

SKIP TO TR1.

RP4. Why do you think that selling ENERGY STAR qualified CFL products is not important to your store's overall business goals? [Important question: probe for responses]

TRAINING

TR1. Has any staff at this store received training to support sales of CFL products?

- Yes 1
- No 2
- Don't know 3

IF TR1 = 1, ASK TR2. ELSE SKIP TO TR8

TR2. What organizations provided this training?

- Manufacturers 1
- Utility program contractors 2
- Utilities 3
- Store staff/managers 4
- Corporate staff/managers 5
- Professional or trade organizations 6
- Efficiency Vermont 7
- Other (Specify:_____) 8

TR3. Over the past two years, how many training sessions or programs were provided?

ENTER NUMBER OF SESSIONS ..... _____

TR4. Approximately how many employees have attended these training sessions?

ENTER NUMBER OF EMPLOYEES ..... _____

TR4a. What categories of employees have gone through training on CFL products?

- Electric or lighting department sales staff 1
- Department managers 2
- Cashiers 3
- Store manager 4
- Other (Specify: _____) 5
- Don't know 6

TR5. What topics were covered in these sessions? [PROMPT IF NECESSARY.]

- Technical performance of CFL lamps and fixtures 1
- Appropriate applications for CFL lamps and fixtures 2
- Advantages/selling points for CFL lamps and fixtures 3
- How to overcome objections to price, appearance 4
- ENERGY STAR product specifications, program operations 5
- Program operations 6
- Other (Specify: _____) 7

Don't know 8

TR6. How effective were these training programs in helping your employees sell CFL products? Would you say they were…

Very effective 1
Somewhat effective 2
Not very effective 3
Not at all effective 4
Don't know 5

IF TR6 = 3 OR 4, ASK TR7. ELSE SKIP TO NEXT SECTION.

TR7. What changes to the training sessions would have made them more effective?

TR8. How does your staff acquire information and become educated about CFL lighting products?

TR8b. What types of information do they acquire on CFL lighting products? (i.e., product benefits, how to sell product, etc.)

PROMOTION AND ADVERTISING

BA1. Does this store do any media advertising for ENERGY STAR qualified CFL products?

- Yes 1
- No 2
- Don't know 3

IF BA1 = 1, ASK BA2. ELSE SKIP TO BA5.

BA2. During the past 12 months, which media have you used to advertise ENERGY STAR qualified CFL products? CIRCLE ALL THAT APPLY.

- Newspaper 1
- Magazines 2
- Radio 3
- TV 4
- Internet 5
- Unpaid media (press releases) 6
- Store circulars 7
- Other (Specify: _____) 8

BA3. During the past 12 months, how often, on average, have you run some kind of media advertisement for ENERGY STAR qualified CFL products?

- Daily 1
- At least once per week 2
- At least once per month 3
- At least once quarterly 4
- Less frequently 5
- Never 6
- Don't know 7

BA5. In the past year have you undertaken any special price promotions (rebates/sales) for ENERGY STAR qualified CFL products?

- Yes 1
- No 2
- Don't know 3

IF BA5 = 1, ASK BA6. ELSE SKIP TO BA8.

BA6. Who provided the rebates or authorized discounts for these promotions?

- Utility 1
- Manufacturers 2
- Efficiency Vermont 3
- Corporate program 4
- Store-based initiative 5
- Other (Specify: _____) 6

BA7. Over the past 12 months, on average, how often have price promotions for ENERGY STAR qualified CFL products been in effect. Would you say it was …

- All the time 1
- At least one week per month 2
- At least one week per quarter 3
- Less frequently 4
- Don't know 5

BA8. Over the past 12 months, has your store posted any in-store advertising for ENERGY STAR qualified CFL products, such as point of purchase displays, shelf talkers, or end caps?

- Yes 1
- No 2
- Don't know 3

IF BA8=1, ASK BA8a. ELSE SKIP TO EV1.

BA8a. What types of in-store advertising?

BA8b. For which products?

BA9. Over the past 12 months, on average, how often have in-store advertising for ENERGY STAR qualified CFL products been up? Would you say it was …

- All the time 1
- At least one week per month 2
- At least one week per quarter 3
- Less frequently 4
- Don't know 5

EFFICIENCY VERMONT RESIDENTIAL LIGHTING PROGRAM

EV1. Are you aware of Efficiency Vermont's program to promote the purchase of ENERGY STAR CFL products? [The program offers customers instant coupons for ENERGY STAR lighting products as well as marketing support for retailers.]

Yes 1
No 2

IF EV1 = 1, ASK EV2. ELSE SKIP TO CONCLUSION.

EV2. Have you or someone at your store been approached by the program operator to participate in the program?

Yes 1
No 2
Don't know 3

EV3. Has your store enrolled in the program?

Yes 1
No 2
Don't know 3

IF EV3 = 2, ASK EV4. ELSE EV5.

EV4a. What is the main reason your store has not enrolled in the program?
EV4b. Are there other reasons?

THANK AND TERMINATE

EV5a. What was the main reason you decided to enroll in the program?
EV5b. Were there other reasons?

EV6. On a scale of 1 to 5, where 5 is very good and 1 is very poor, how would you rate the following elements of the Efficiency Vermont program? ENTER 6 FOR DON'T KNOW.

a. Assistance with in-store promotion..... _____

b. Training for staff..... _____

c. Rebate processing ..... _____

EV7a. Why did you give each of the program elements these ratings…

a. How about Assistance with in-store promotion?

b. And Training for staff?

c. And Rebate processing?

EV8a. Has the Efficiency Vermont program influenced your *stocking* of EnergyStar qualified CFL products? How so?

EV8b. Has the program influenced your *promotion* of EnergyStar qualified CFL products? How so?

EV8c. Has the program influenced your *sales* of EnergyStar qualified CFL products? How so?

EV8. Do you have any suggestions to help improve the program? If so, what are your suggestions?

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.

B

ON-SITE INSPECTION FORM AND CUSTOMER QUESTIONNAIRE

B.1 PRODUCT ON-SITE SURVEY

GENERAL INFORMATION (GI)

GI1 - Owner Name _____

GI2 - Name of individual present during on-site survey _____

GI3 - House Address _____

GI4 - City/State/Zip _____

GI5 - Telephone Number _____

GI6 – Customer ID # _____

BUILDING INFORMATION (BI) (determine on-site)

BI1 – House Type 1. Detached single-family 2. Attached single-family 3. Two-family 4. Three or more family 5. Other:_____

BI2 – Year built (ask homeowner) _____

BI3 - Floors On or Above Grade 1 – One 2 – Two 3 – Three 4 – Four 5 – Five

BI4 - Foundation type 1. Poured concrete 2. Block 3. Fieldstone 4. Rubble Stone 5. Other_____

BI5 – Basement Actively Heated (1) Yes (2) No

BI6 – Basement Actively Cooled (1) Yes (2) No

BI7 – Attached Garage (1) Yes (2) No

BI8 – Garage Heated (1) Yes (2) No

BI9– Whole house fan or Attic fan (1) Yes (2) No
(Fan mounted in hallway ceiling on top floor that draws in air from the house and blows out through the attic)

BI10 – Electric Meter Account Number _____

BI11 – Estimated total floor space in home (s.f.) _____

BI12 – Estimated floor space that is conditioned living area (s.f) _____

BI13 - Number of Bedrooms _____

OI1 – Number of Occupants _____

OI2 – Year home purchased _____

FUEL CONSUMPTION (FC)

Fuel	Amount:		Source of Info: (1) Supplier Records (2) Owner Records (3) Owner Recollection
FC1 – Annual Electricity Usage	_____	kWh	_____
FC2 – Annual Natural Gas Usage	_____	(1) therms or (2) ccf	_____
FC3 – Annual Oil Usage	_____	gallons	_____
FC4 – Annual Kerosene Usage	_____	gallons	_____
FC5 – Annual Liquid Propane Usage	_____	gallons	_____
FC6 – Annual wood usage	_____	cords	_____

APPLIANCES

Dishwashers (ADW)

ADW1 – Total number of dishwashers in the house _____

	Manufacturer (A)	Model # (B)		Estimated Age: # Years old (D)	EE Condition Rating (E)
ADW2					
ADW3					

ADW10 – Record major energy saving opportunities with dishwashers (List recommendations and reasons):

Oven Range (AOR)

AOR1 Total number of oven ranges in the house _____

	Manufacturer (A)	Model # (B)	Fuel Type: 1 – Natural gas 2 – Electric, 3 – LP (C)	Estimated Age: # Years old (D)	EE Condition Rating (E)
AOR2					
AOR3					

AOR10 – Record major energy saving opportunities with oven ranges (List recommendations and reasons):

Refrigerators (AR)

AR1 - Total number of refrigerators in the house _____

	Manufact-urer (A)	Model # (B)	Size - ft^3 (C)	Estimated Age: # Years old (D)	EE Condition Rating (E)	Operation: 1-Continuous 2 –Intermittent (F)	Location: 1-Continuous 2 –Intermittent (G)
AR2							
AR3							
AR4							

AR10 – Record major energy saving opportunities with refrigerators (List recommendations and reasons):

Freezers (stand alone) (AF)

AF1 - Total number of freezers in the house _____

	Manufact-urer (A)	Model # (B)	Size - ft^3 (C)	Estimated Age: # Years old (D)	EE Condition Rating (E)	Operation: 1-Continuous 2 -Intermittent (F)	Location: 1-Continuous 2 -Intermittent (G)
AF2							
AF3							

AOF10 – Record major energy saving opportunities with freezers (List recommendations and reasons):

Clothes Washers (ACW)

ACW1 – Total number of clothes washers in the house _____

	Manufacturer (A)	Model # (B)	Type: 1 – Front loader (Horiz. Axis) 2 - Top loader (C)	Estimated Age: # Years old (D)	EE Condition Rating (E)
ACW2					
ACW3					

ACW10 – Record major energy saving opportunities with clothes washers (List recommendations and reasons):

Clothes Dryer (AD)

AD1 – Total number of clothes dryers in the house _____

	Manu-facturer (A)	Model # (B)	Fuel Type: 1 – Natural gas 2 – Electric 3 – LP (C)	Estimated Age: # Years old (D)	EE Condition Rating (E)	Vent to: 1-Cond. Space 2-Uncond. Sp. 3-Outside (F)	Duct Type 1-Alum. 2-Plastic 3-Other (G)	Damper: 1 – Yes 2- No (H)
AD2								
AD3								

AD10 – Record major energy saving opportunities with clothes dryers (List recommendations and reasons):

Room Air Conditioners (AAC)

AAC1 – Total number of RAC units in the house _____

	Manufacturer (A)	Model # (B)	Size - Btuh (C)	Estimated Age: # Years old (D)	EE Condition Rating (E)
AAC2					
AAC3					
AAC4					
AAC5					

AAC10 – Record major energy saving opportunities with room air conditioners (List recommendations and reasons):

Energy Efficiency Condition Rating	***Criteria, Consider for …***
1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Dishwasher: condition of door seal, heating element, etc. Oven Range: condition of door seal, reflector pan, jets or heating pads, etc. Refrigerator & freezer: condition of seal, coils, frost, etc. Clothes washer: noise level, rust, leaks, etc. Clothes dryer: noise level, rust, lint, etc. Room Air conditioner: condition of air filter, evaporator, condenser, etc.

AOT1 – Number of microwave ovens	_____	
AOT2 – Number of ceiling fans	_____	
AOT3 – Number of water beds	_____	
AOT4 – Central Vacuum	(1) Yes	(2) No
AOT5 – Sauna	(1) Yes	(2) No
AOT6 – Jacuzzi	(1) Yes	(2) No
AOT7 – Hot Tub	(1) Yes	(2) No
AOT8 – Swimming Pool	(1) Yes	(2) No
AOT9 – Swimming Pool Location	(1) Inside	(2) Outside
AOT10 – Swimming Pool Heating	(1) Heated	(2) Unheated
AOT11 – Number of *dehumidifiers*		_____
AOT12 – Note room locations of *dehumidifiers*		_____
AOT13 – Number of *humidifiers*		_____
AOT14 – Not room locations of humidifiers		_____

Lighting (LI / LE)

By Room Loc.	Room Location (enter code) (A)	Lighting Fixtures		Light Bulbs		Controls (enter codes; separate with commas if multiple codes) (F)
		Total Number of Fixtures (B)	Number of fixtures which are CFL Pin-based Models (C)	Total Number of light bulbs (D)	Number of light bulbs which are screw-in or pin-based CFL models (E)	
INTERIOR FIXTURES						
LI1						
LI2						
LI3						
LI4						
LI5						
LI6						
LI7						
LI8						
LI9						
LI10						
LI11						
LI12						
LI13						
LI14						
LI15						
LI16						
LI17						
LI18						
LI19						
LI20						
EXTERIOR FIXTURES						
LE1						
LE2						
LE3						
LE4						

LS1 – Record major energy saving opportunities with Lighting (List recommendations and reasons):

LIGHTING CODES

Location of Fixture	Code	Lighting Controls	Code
1 Bedroom	BR	1 On/Off	O
2 Dining room	DR	2 Dimmer/Rheostat	D
3 Living room	LR	3 Motion Sensor	M
4 Kitchen	K	4 Photo-cell	P
5 Bathroom	BT	5 Combined motion/photo	C
6 Hallway	H	6 Timer control	T
7 Family room/den	FD		
8 Office	O		
9 Enclosed porch/entry	P		
10 Basement	BS		
11 Garage	G		
12 Other	X		

VENTILATION (VE)

Mech. Ventilation	Fan 1 (A)	Fan 2 (B)	Fan 3 (C)	Fan 4 (D)	Fan 5 (E)	Fan 6 (F)
VE1 – Type/Location (enter code)						
VE2 – Control Type (enter code)						
VE3 – Vent to Location (enter code)						
VE4 – Manufacturer						
VE5 – Model Number						
VE6 – ERV or HRV Efficiency						
VE7 – Damper present (1-Yes, 2-No)						
VE8 – EE Condition Rating (enter code)						

Type / location: 1 – Bath exhaust fan; 2 – Kitchen exhaust fan; 3 – Other point exhaust fan; 4 – ERV; 5 – HRV; 6 – Exhaust Only

Control Type: 1 – On /off switch; 2 – Twist timer; 3 – Time clock; 4 – Dehumidistat; 5 – Occupancy sensor; 6 – Runs continuously

Vent to Location: 1 – Outside; 2 – Living space; 3 – Attic; 4 – Basement; 5 – Interstitial

Energy Efficiency Condition Rating	
1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Criteria: Consider presence of rust, dust, noise level, grease filter, etc.

VE10 – Record major energy saving opportunities with Ventilation (List recommendations and reasons):

WINDOWS (EW)

By Size Category	Small Type 1 (A)	Small Type 2 (B)	Medium Type 1 ©	Medium Type 2 (D)	Large Type 1 (E)	Large Type 2 (F)	Picture (G)	Other (H)
Size of window: Area (feet)	Less than 2'x4'	Less than 2'x4'	Between 2'x4' and 3'x6'	Between 2'x4' and 3'x6'	Greater than 3'x6' with dividers	Greater than 3'x6' with dividers	Greater than 3'x6' with no dividers	
EW1 – Number of Windows								
EW2 – Frame type (see below)								
EW3 - Glazing type (see below)								
EW4– (1) Operable OR (2) Fixed								
EW5– Storm Window (1=Yes, 2=No)								
EW6 – Storm Window Type (1=Alum, 2=Wood, 3=Other)								
EW8– Overall EE condition rating (see below)								

FRAME TYPE	**GLAZING TYPE**	Condition Rating	
M - Metal MB - Metal w/break W - Wood V - Vinyl F - Fiberglass	1. Single 2. Double 3. Triple 4. Other	1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Criteria: Consider number and size of infiltration points, loose or cracked glass, tightness of fit, condition of frame, weather stripping, etc

EW20 – Record major energy saving opportunities with Windows (List recommendations and reasons_:

HVAC – HEATING (HVH)

HVH1 - Number of central systems in home _____

BY UNIT	Unit (A)	Unit (B)	Unit (C)
HVH2 – Fuel (see below)			
HVH3 – System Type (see below)			
HVH4 – System capacity Input (Btu/hr)			
HVH5 – System capacity Output (Btu/hr)			
HVH6 – System efficiency (AFUE or HSPF)			
HVH7 – Manufacturer			
HVH8 – Model number			
HVH9 – Estimated Age (# years)			
HVH10 – Sealed Combustion (1=Yes 2=No)			
HVH11 – System location (1=Cond Space, 2=Uncond.)			
HVH12 – Primary (1) or secondary (2) heating source?			
HVH13 – length of pipe/duct run in unconditioned space (feet)			
HVH14 - % of pipe/duct run with insulation (of length in unconditioned space)			
HVH15 – Pipe/duct insulation condition rating (see below)			
HVH16 – Number of zones			
HVH17 – Total # of thermostats			
HVH18- # of setback thermostats			

HVH20 – Number of wood stoves _____

HVH21 – Number of fire places by fuel type: # Wood ____ # Propane____ # Gas____

HVH22 – Number of space heaters by fuel type: # Electric____ # Propane____ # Kerosene___

HVH23 – Note roomlocations of space heaters _____

FUEL	SYSTEM TYPE	INSULATION CONDITION RATING	
O - Oil NG -Gas LP - Propane E - Electric W –Wood C – Coal	FA - Forced Warm Air FW - Forced Hot Water S - Steam EB - Electric Baseboard ER - Electric Radiant AAHP - Air to Air Heat Pump GSHP - Ground Source Heat Pump HA - Hydro Air	1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Criteria: Consider thickness, number and size of voids, coverage around bends, etc

HVH30 - Record major energy saving opportunities with HVAC Heating systems (List recommendations and reasons):

HVAC – COOLING (HVC)

HVC1 - Number of central systems in home _____

BY UNIT	*Unit (A)*	*Unit (B)*	*Unit (C)*
HVC2 - System capacity Input (Btu's/hour)			
HVC3 - System capacity Output (Btu's/hour)			
HVC4 – System efficiency (SEER)			
HVC5 – Manufacturer			
HVC6 - Model number of compressor/condensing unit			
HVC7 - System location of fan/air handler (1=Cond Space, 2=Uncond.)			
HVC8 – Length of Duct run in unconditioned space (feet)			
HVC9 - % of Duct run with insulation (of length in unconditioned space)			
HVC10 – Duct insulation condition rating (see below)			
HVC11 –Duct sealant type (1=Mastic 2=Duct tape 3=Other)			
HVC12 – Duct seal condition rating (see below)			

INSULATION & SEAL CONDITION RATING	
1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Criteria: For insulation, consider thickness, number and size of voids, coverage around bends, etc
	Criteria: For seal, consider coverage of sealant, number and size of cracks, adhesion, etc

HVC20 - Record major energy saving opportunities with HVAC Cooling systems (List recommendations and reasons):

DOMESTIC HOT WATER (DHW)

DHW1 - Number of domestic water heaters in home _____

BY UNIT	*Unit (A)*	*Unit (B)*	*Unit (C)*
DHW2 – Fuel (see below)			
DHW3 – Type (see below)			
DHW4 – Capacity (gallons)			
DHW5 – Tank location (1=Cond Space, 2=Uncond.)			
DHW6 – System Efficiency (Energy factor)			
DHW7 – Manufacturer			
DHW8 – Model number			
DHW9 – Estimated age (# years old)			
DHW10 – R-value on *original* tank insulation			
DHW11 – *Additional* tank insulation present (1=Yes, 2=No)			
DHW12 – R-value on *additional* tank insulation			
DHW13 – Overall tank insulation condition rating (see below)			
DHW14 – Length of Piping run in unconditioned space (feet)			
DHW15 - % of Piping run with insulation (of run in unconditioned space)			
DHW16 – Pipe insulation condition rating (see below)			

Domestic Hot Water Codes

FUEL	UNIT TYPE	INSULATION CONDITION RATING	
O -Oil NG -Gas LP - Propane E - Electric W – Wood C - Coal	1. Conventional tank 2. High efficiency tank 3. Indirect fired 4. Tankless coil 3. Instantaneous 5. Heat pump	1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Criteria: For insulation, consider thickness, number and size of voids, coverage around bends, etc

DHW20 - Record major energy saving opportunities with Domestic Hot Water systems (List recommendations and reasons):

FRAME FLOORS ABOVE UNCONDITIONED SPACE

EFF1 – Estimate of total area (length x width in feet) _____

BY FLOOR SECTION:	Section (A)	Section (B)	Section (C)	Section (D)	Section (E)
EFF2 – Estimate of section area (length x width in feet)					
EFF3 – Insulation Present (1=Yes, 2=No)					
EFF4 – Type of Insulation (see below)					
EFF5 – Thickness of Insulation (inches)					
EFF6 - Insulation R-Value					
EFF7 – Insulation Condition rating (see below)					
EFF8 - Floor location (see below)					

Insulation Type	**Insulation Condition Rating**		**Floor location. Floor is located between:**
FB - Fiberglass batt FL - Fiberglass loose fill RW – Rock wool loose fill CL – Cellulose loose fill DP – Dense pack cellulose RB –Rigid Board SF – Spray/expand. foam V - Vermiculate	1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Criteria: Consider extent of moisture, voids, fluffing, etc	1. Conditioned area and unconditioned garage 2. Conditioned area and unconditioned basement or crawl space 3. Conditioned area and semi-conditioned basement or crawl space (with furnace or boiler) 4. Conditional area and ambient conditions

EFF10 - Record major energy saving opportunities with Frame Floors above Unconditioned Space Insulation (List recommendations and reasons):

ATTIC INSULATION (AI)

ECR1 – Estimate of total area (length x width in feet) _____

BY CEILING SECTION	Segment (A)	Segment (B)	Segment (C)	Segment (D)	Entry Hatch
ECR2 – Estimate of section area (length x width in feet)					
ECR3 – Insulation Present (1=Yes, 2=No)					
ECR4 – Type of Insulation (see below)					
ECR5 – Thickness of Insulation (inches)					
ECR6 - Insulation R-Value					
ECR7 – Insulation Condition rating (see below)					
ECR8 - Vapor barrier present? (1=Yes, 2=No)					
ECR9 – Attic Ventilation? (1=Yes, 2=No)					
ECR10 - Ceiling type (see below)					

Insulation Type	**Insulation Condition Rating**		**CEILING TYPE**
FB - Fiberglass batt FL - Fiberglass loose fill RW – Rock wool loose fill CL – Cellulose loose fill DP – Dense pack cellulose RB –Rigid Board SF – Spray/expand. foam V - Vermiculate	1 - Very Poor 2 – Poor 3 – Fair 4 – Good 5 – Very Good	Criteria: Consider extent of moisture, voids, fluffing, etc	1. Ceiling with attic above 2. Cathedral ceiling / no attic 3. Flat roof with no attic

ECR20 - Record major energy saving opportunities with Attic Insulation (List recommendations and reasons):

POST INTERVIEW (PI)

Ask the occupant the following questions, if applicable. Otherwise circle NA.

CFL Products & FL Clothes washers	PI1	PI2	PI3
Where did you purchase your…? (Circle as many as applicable)	CFL light bulbs	CFL light fixtures	Front-loading clothes washer
Home Center (i.e., Home Depot)	1	1	1
Discount Retail Store (i.e., Walmart)	2	2	2
Buying club (i.e., B.J.'s Wholesale)	3	3	3
Supermarket	4	4	4
Hardware store	5	5	5
Department Store (i.e., Sears)	6	6	6
Appliance store	7	7	7
Lighting supply store	8	8	8
Mail Order Catalog	9	9	9
Over the Internet	10	10	10
Home Show	11	11	11
Other: _____	99	99	99
Don't know	97	97	97
Not Applicable	NA	NA	NA

Portable Space Heaters:

P14 – How is the space heater operated during heating season?
(1) continuous (2) intermittent (NA) Not applicable

P15 – Why are you using a space heater in your home?

Humidifiers:

P16 – How is the *humidifier* operated during heating season?
(1) continuous (2) intermittent (NA) Not applicable

P17 – Why are you using a *humidifier* in your home?

Dehumidifiers:

P18 – How is the dehumidifier operated during cooling season?
(1) continuous (2) intermittent (NA) Not applicable

P19 – Why are you using a *dehumidifier* in your home?

SURVEY DOCUMENATION (SD)

SD1 - Auditor name _____

SD2 - Date surveyed _____

SD3 – Requested home energy report? (1) Yes or (2) No

B.2 CUSTOMER QUESTIONNAIRE

Name: _____
Address: _____
City: _____
Phone Number: _____
ID #: _____

Home Energy Issues

1. On a scale of 1 to 10, where 1 is very inefficient and 10 is very efficient, please rate the energy efficiency of your home. (*Please circle your response*)

1	2	3	4	5	6	7	8	9	10	Don't Know
Very Inefficient									Very Efficient	

2. What are the main reasons that you chose this rating?

3. Are there any energy-saving improvements that you would like to make to your home? (*Please circle your response then follow the instructions to the right of your response*)

Yes	→ *Go to Question 4*
No	→ *Go to Question 10*
Don't Know	→ *Go to Question 10*

4. What energy-saving improvements would you like to make to your home?

5. How did you decide to focus on these improvements?

6. Do you think you will make any of these energy-saving improvements within the next five years? (*Please circle your response then follow the instructions to the right*)

Yes	→ *Go to Question 7*
No	→ *Go to Question 8*
Don't Know	→ *Go to Question 8*

7. Which improvements do you plan to make within the next five years?

→ *Answer Question 7 then go to Question 9*

8. What are the main reasons for not making these energy-saving improvements?

9. What would you need to proceed with these energy-saving improvements…
(*Please circle your response to each question*)

a. Do you need more information?

Yes No Don't Know

b. Do you need assistance finding someone to perform the work?

Yes No Don't Know

c. Do you need financing to help pay for the work?

Yes No Don't Know

d. What else do you need to make these energy-saving improvements? *Please write down anything else you might need.*

Products

10. Have you purchased any energy efficient products in the past year? (*Please circle your response then follow the instructions to the right*)

Yes	→ *Go to Question 11*
No	→ *Go to Question 14*
Don't Know	→ *Go to Question 14*

11. What energy efficient products have you purchased in the past year?

12. How did you identify these products as energy efficient?

13. What were your main reasons for purchasing these efficient products?

Information

14. Where would you seek information about major purchases for your home, such as appliances?

15. Where would you seek information about energy conservation and energy efficiency in your home?

16. Where would you seek information about contractors who might do renovation work for your home?

Efficiency Vermont

17. Prior this survey, had you heard of Efficiency Vermont? (*Please circle your response then follow the instructions to the right*)

Yes	→ *Go to Question 18*
No	→ *Go to Question 19*
Don't Know	→ *Go to Question 19*

18. What is Efficiency Vermont and/or what does it do? (*Please write down whatever you know about Efficiency Vermont)*

Demographics

19. Which of the following best describes the highest level of education you've received? (Please circle your response)

Some high school	1
High school graduate	2
Trade or technical school	3
Some college	4
College graduate	5
Some graduate school	6
Graduate degree	7
Don't know	97

20. Which of the following best represents your annual household income in 2001 from all sources, before taxes? (*Please circle your response)*

Less than $25,000 per year	1
$25,000-49,999	2
$50,000-74,999	3
$75,000-99,999	4
$100,000 or more	5
Don't know	97
Refused	98

Questionnaire Completed. Thank You!

C

MARKET SHARE MODEL

C.1 INTRODUCTION

To assess the net effect of the EPP on the market share ENERGY STAR appliances in Vermont, XENERGY estimated regression model of market share of an ENERGY STAR appliance in state *s* for each appliance and year for which complete state-by-state market share information was available from the DOE tracking system. The form of the model was:

$$MS_{ays} = a + b1ED_s + b2MI_s + b3PR$$

where:

MSays = the ENERGY STAR market share of appliance *a* in state *s* in year *y* as measured for chain outlets reporting to the DOE tracking system.

ED_s = the percentage of persons over 25 with a bachelor's degree or further educational attainment, as estimated by the 2000 United States Census.

MI_s = the median income of households in the state, as estimated by the 2000 United States Census.

PR = an indicator variable that took the value 1 if the there had been active utility or regional incentive programs available to most consumers in the state for at least 2 years during the period from 1999 to 2001. The sources for this characterization were ENERGY STAR appliance program overviews available from the Consortium for Energy Efficiency (CEE), the Northeast Energy Efficiency Partnerships (NEEP), the Northwest Energy Efficiency Alliance, and the ENERGY STAR partner web site.

In developing the model we also examined the effect of including other variables that other studies have identified as being associated with adoption of energy efficient products. These included:

- the price of electricity, as measured by the average revenue per kWh sales to residential customers in the state (Energy Information Administration);
- the percentage of the population in the age group 45 – 54 (U. S. Census), a group that is typically overrepresented among participants in energy efficiency programs; and,
- the presence of utility or state agency programs that promote ENERGY STAR appliances without providing incentives.

None of these variables entered the model with significant coefficients, and none contributed significantly to the ability of the model to explain state-to-state variation in ENERGY STAR market share.

See Table C-1 for complete references for data sources used.

Table C-1
Data Sources Used for the Market Share Model

Variable	Organization	Document Title/Date	URL
MSays: ENERGY STAR Market Share	US EPA	*Energy Star Appliance Sales Reports, 1998, 1999* *Energy Star Appliance Sales Data: 2000, 2001, Quarter 2 2002*	www.epa.gov/opie/library
ED_s*:* Percent of persons 25+ with bachelors degree	US Census	US Census 2000, Summary File 3, Geographic Comparison Tables	http://factfinder.census.gov
MI_s*:* Median household income	US Census	US Census 2000, Summary File 3, Geographic Comparison Tables	http://factfinder.census.gov
PRs: Presence of program (0/1)	Consortium for Energy Efficiency Northeast Energy Efficiency Partnerships Northwest Energy Efficiency Alliance	Residential Home Appliance Program National Summary, May 2002 Initiative Report, 2002 sponsor list Market Progress Evaluation Report(s): Energy Star Resource Efficient Clothes Washers. 6/01, 11/00, 5/99	www.cee1.org www.neep.org www.nwalliance.org

We estimated the model for each appliance in each year 1999 – 2001 for which complete data were available ENERGY STAR market share. Complete data were available for all years and appliances except room air conditioners in 1999. We then took the following steps to generate estimates of the net effect of the Vermont EPP on ENERGY STAR market share for each appliance and year.

1. Examine the model results to assess its suitability for estimating ENERGY STAR market share. This involved examining the sign and statistical significance of the coefficients and the portion of total variation in ENERGY STAR market share that the model accounted for (R^2). The model was accepted for further use in the analysis if the coefficients were statistically significant at the 10 percent probability level and had the expected signs, and if the *F* statistic for the model exceeded the critical value. This latter condition means that the observed relationship between the variables is very unlikely to have occurred by chance. In some cases, applying these criteria led us to drop either the income or education variables when they entered the equation with insignificant coefficients or the unexpected sign. For some years and appliances, the model did not meet the criteria for use in further analyses. There seems to be little discernible pattern to interstate

differences in ENERGY STAR market share for refrigerators, and the model yielded no acceptable results for any of the years. The dishwasher model for 1999 also did not meet the criteria for use in further analysis.

2. Apply the model results to estimate Vermont's ENERGY STAR market share with and without the presence of the program. This involved enumerating the model with Vermont's demographic variables with the indicator variable for the presence of the program set at 1, then at 0.
3. Compare the estimated ENERGY STAR market share to the actual share for Vermont. If the estimate and the actual were within a few percentage points of each other, we concluded that the model was a reasonable representation of the Vermont market for that year. This was the case for all of the appliances except clothes washers. For that appliance, actual ENERGY STAR market share in Vermont significantly exceeded the model estimate.
4. Estimate the net effect of the program as the difference between the actual market share and the estimated share with the program indicator variable set to 0. We present this result with a 90 percent confidence interval based on the standard error of Y (the ENERGY STAR market share variable).
5. Adjust the net program effect on market share to account for differences in Vermont between the chain retailers represented in the DOE data base and independents in the percentage of ENERGY STAR appliances sold, by appliance type and year. This was accomplished by multiplying the difference between observed market share in chain outlets and the model estimate with the program variable set to zero by the ratio of chain store market chair to the weighted average share for chains and independents.

C.2 SUMMARY OF MODEL RESULTS

Table C-2 summarizes the key results for each run of the model by year and appliance.

Table C-2
Summary of Market Share Model Results

	Coefficients						
	Program	**Education**	**Income**	**Intercept**	**R^2**	**d.f.**	***F^3***
Clothes Washers							
2000	0.064	0.003	1.222E-06	-0.037	0.685	45*	32.58
t values	6.91	3.20	1.89	-1.36			
2001	0.073	0.003	2.072E-06	-0.050	0.668	45*	30.12
t values	6.32	2.74	2.57	-1.47			
2002	0.10	0.004	2.795E-06	-0.06	0.603	45*	22.79
t values	5.48	2.41	2.24	-1.18			
Refrigerators							
2000	0.013	0.003	-3.137E-07	0.227	0.138	46	2.46
t values	1.03	2.21	-0.39	6.33			
2001	0.003	0.000	1.454E-06	0.092	0.155	46	2.81
t values	0.32	0.44	2.35	3.35			
2002	0.03	0.001	3.154E-06	0.03	0.633	46	26.46
t values	3.64	1.65	5.57	4.41			
Dishwashers							
2000	0.001		2.08E-06	0.008	0.212	47	6.33
t values	0.15		3.38	0.34			
2001	0.028		2.36E-06	0.028	0.386	47	14.80
t values	2.83	-0.001	3.71	1.09			
2002	-0.02	-0.58	0.00	0.33	0.028	46	0.43
t values							
Room AC							
2000	0.019	0.001	1.62E-06	0.082	0.269	46	5.64
t values	1.71	1.26	2.20	2.51			
2001	0.018	0.002	3.43E-06	0.005	0.472	46	13.70
t values	1.56	1.46	4.51	0.15			
2002	0.126			0.339	0.221	48	13.62
t values	3.691			22.249			

Notes to Table C-2

1. Observation for Alaska was excluded as an outlier. Alaska had by far the highest ENERGY STAR clothes washer market of any state for the entire study period even though no programs were in effect. The reasons for this result are not clear.
2. The critical value for the t-statistic with degrees of freedom ranging from 45 – 47 is approximately 1.687.
3. The critical values for *F* given the number of observations and variables used in the models ranges from 2.60 to 2.82.
4. The refrigerator model was not considered to have sufficient explanatory power to use in estimating the net program effects on market share in 2000 and 2001.
5. The education variable was not included in the dishwasher model for 2000 and 2001 because it had a very low t-statistic.
6. The education and income variables were not included in the 2002 Room AC model because they had very low t statistics.

D

CHARACTERISTICS OF EPP ON-SITE SAMPLE

D.1 SURVEY RESEARCH PLAN

Sample Recruitment. A random sample of potential participants from he entire state of Vermont was drawn from a commercially available residential directory. Study participants were recruited over the phone by subcontractor Research America during April 2002.

In order to garner a reasonable sample of existing homes in Vermont, several criteria were used to qualify participants, including:

- Homes could be owner-occupied or rental properties
- Homes could be single-family detached, townhouses, manufactured homes, or single units within multifamily homes that have separate heating and cooling systems
- Homes must have been built more than five years ago (before 1997)
- Homes must be occupied year-round (no seasonal properties)

One hundred twenty five Respondents who qualified for the above criteria were offered a $50 incentive to participate in the onsite survey. In addition, contact information and an appropriate call back time was determined to allow the energy auditors to individually schedule each onsite survey. In early May 2002, an advance letter was sent to all customers who agreed to participate reminding them of their upcoming auditor visit, and individual auditors then called to schedule onsite surveys.

Survey Approach. Once on site, auditors distributed a concise self-administered questionnaire to the customer and then proceeded to inspect the home and conduct a brief post-interview with the customer. Self-administered surveys were collected by the auditors and returned to XENERGY for analysis along with the onsite surveys. Auditors completed 71 onsite surveys with Vermont residents between June and August of 2002.

Survey Design. The onsite research was designed to assess selected home features in order to characterize the energy efficiency and energy saving opportunities in existing homes. During each onsite survey, auditors performed the following tasks:

- *Building Shell*. Record the age and type of home, square footage, number of floors, number and types of windows, and general information on levels of insulation. Note any obvious leaks or insulation problems.
- *Fuel Consumption.* Record annual usage of electricity, natural gas, oil, kerosene, liquid propane, and fuel wood.
- *Appliance Inventory*. Record detailed information on major appliances including dishwashers, oven ranges, refrigerators, stand-alone freezers, clothes washers, clothes

dryers, and room air conditioners including number, age, fuel type, manufacturer, and model number. Indicate number of additional appliances including microwave ovens, ceiling fans, water beds, central vacuum, saunas, Jacuzzis, hot tubs, swimming pools, humidifiers, and dehumidifiers. Note room locations for humidifiers and dehumidifiers.

- *Lighting Inventory*. Record fixture type, number of bulbs by type, controls (dimmer, motion sensor, timer, etc.), room location, and source of CFL products purchases.
- *Ventilation*. Record type, location, controls, efficiency, manufacturer, and model number for all ventilating fans.
- *Windows.* Record number, size, and location of all windows. Detail glazing type and other characteristics and rate overall condition of windows.
- *HVAC*. Record system type, size, age, condition, and efficiency (if available) of all centralized heating and cooling equipment. In addition, record condition and insulation of distribution system, thermostat type, and number of woodstoves, space heaters, and fireplaces.
- *Hot Water*. Record system type, size, age, and location, and detail insulation of pipes and heating unit.
- *Insulation.* Record presence, type, location, thickness, R-value, and other characteristics of insulation in attic and frame floors.

Auditors also recorded major energy savings recommendations for the above features. Each onsite survey took roughly two hours to complete.

The self-administered customer surveys asked respondents to do the following:

- *Efficiency Upgrades*. Record recent and intended efficiency upgrades, as well as the barriers to following through on desired upgrades.
- *Efficient Products.* Specify sources of information on efficient products and contractors.
- *Efficiency Vermont*. Indicate awareness of Efficiency Vermont and the services provided by the organization.

Results from both of these surveys (the self-administered customer survey and the onsite audit) were analyzed to provide information about the general efficiency of homes in Vermont as well as the potential for additional improvements, especially with regard to lighting and appliances. These results are discussed in the following sections.

D.2 RESPONDENT CHARACTERISTICS

D.2.1 Income and Education Level

Approximately 41 percent of onsite survey participants were college graduates, and 97 percent were high school or trade school graduates. Approximately one-fourth of the participants have household incomes of less than $25,000 per year, and approximately 35% had incomes of $50,000 or more per year. Additional detail is provided in Table 1 and Table 2.

Table 1
Education Level of Survey Participants

Highest Level of Education Completed	Frequency	% of Total	Cumulative Percentage
Graduate degree	10	14%	14%
Some graduate school	4	6%	20%
College graduate	15	21%	41%
Some college	13	19%	60%
Trade school / high school graduate	26	38%	97%
High school	*20*	*29%*	-
Trade school	*6*	*9%*	-
Some high school	2	3%	100%
Number of Respondents	**70**	**100%**	**-**

Table 2
Household Income of Survey Participants

	Sample		
Annual Income	Frequency	% of Total	Cumulative Percentage
$100,000 or more	2	3%	3%
$75,000 - 99,999	6	9%	12%
$50,000 - 74,999	16	23%	35%
$25,000 - 49,999	28	41%	75%
$0 - $24,999 per year	17	25%	100%
Number of Respondents	**69**	**100%**	**-**

D.2.2 Home Characteristics

Home Age, Size, Occupancy, and Other Characteristics. Table 3 provides an overview of home age, size, and other characteristics for survey participants. More than a third of the homes included were at least 100 years old (Table 4).

Table 3
Overview, Characteristics of Survey Participants' Homes

Housing Characteristic	Mean or % of Total
Year Built (Range: 1800 – 1993)	1929
Number of Rooms (Range: 2 – 14)	7
Home Size in Square Feet (Range: 540 – 4,000)	1,675
Number of Occupants (Range: 1 – 8)	2.5
Detached Single-Family Home	94%
Home Has Attached Garage	30%
Home Has Heated Basement	31%
Home Has Poured Concrete Foundation	45%
Number of Respondents	**71**

Table 4
Distribution of Survey Participants' Homes by Year Built

Year Built	Frequency	% of Total
1800 – 1850	12	17%
1851 – 1900	14	20%
1901 – 1950	9	13%
1951 – 1975	18	26%
1976 – 1993	16	23%
Number of Respondents	**69**	**100%**

D.2.3 Energy Efficiency Ratings and Products

Self-Ratings of Home Energy Efficiency. When asked to rate their home's efficiency on a scale of one to ten (one being very inefficient, 10 being very efficient), more than 40 percent of survey participants gave their homes ratings of 7 or higher (Table 5). Approximately 20 percent gave their homes ratings of four or below.

Table 5
Self-Rating of Home Efficiency by Survey Participants on 10-Point Scale

Home Efficiency Self-Rating	Frequency	% of Total	Cumulative Percentage
10 – Very Efficient	2	3%	3%
9	4	6%	9%
8	11	16%	25%
7	12	18%	43%
6	10	15%	58%
5	13	19%	78%
4	6	9%	87%
3	7	10%	97%
2	1	1%	99%
1 – Very Inefficient	1	1%	100%
Number of Respondents	**67**	**100%**	**-**
Mean Rating	**5.96**		

Reasons for Selecting High Home Efficiency Ratings. Respondents were asked to record the main reasons (multiple reasons were allowed) for choosing the above ratings. Among the 27 respondents who gave their homes high efficiency ratings (between 7 and 10, inclusive), reasons included the following:

- the home had new or efficient windows (cited by 26 percent of respondents who gave their homes high ratings);
- utility bills were relatively low (22 percent);
- the home was new, recently remodeled, or recently renovated (19 percent);
- the respondent felt that the home was adequately heated during the winter months (15 percent);
- the home had new or efficient heating equipment (15 percent);
- the home had new or efficient appliances (11 percent); and
- the home is well insulated (11 percent).

Reasons for Selecting Low Home Efficiency Ratings. Among the 14 respondents who gave their homes lower efficiency ratings (between 1 and 4, inclusive), reasons included:

- the home is old or in need of repair (cited by 29 percent of respondents who gave their homes low ratings);
- utility bills were relatively high (21 percent);
- the home has old or inefficient appliances (21 percent);

- the home has old or inefficient heating equipment (21 percent); and
- the home has old windows and/or doors (14 percent).

Energy Efficiency Upgrades. Survey participants were asked to indicate any energy-saving improvements they would like to make to their homes. The most frequently mentioned improvements were:

- new windows (mentioned by 38 percent of respondents);
- add insulation, or improve existing insulation (28 percent); and
- replace furnace (13 percent).

Approximately 60 percent of all survey respondents indicated that they planned on making at least some of these improvements within the next five years. Among those who would not be making any improvements within the next five years, respondents cited a lack of funds as their primary reason.

Efficient Products. Customers were asked a series of questions regarding purchase of efficient products in the self-administered questionnaire. These questions detailed types of products purchased as well as sources of information about efficient products and reasons for purchasing them.

Efficient Product Purchases. Thirty-five percent of the survey participants indicated that they had purchased energy efficient products within the past year. Of these 25 respondents, more than one-third (36 percent) indicated that they had purchased an efficient refrigerator within the past year. Efficient lighting products were purchased by approximately 28 percent of these respondents. Additional detail is provided in

Table 6.

Table 6
Efficient Products Purchased by Survey Participants Who Purchased Efficient Products Within the Past Year, by Product Type

Efficient Product	Frequency	% of Total
Refrigerator	9	36%
Efficient Lighting (CFL Bulbs / Fixtures)	7	28%
Clothes Washer	4	16%
Water Heater	4	16%
Windows and / or Doors	4	16%
Clothes Dryer	2	8%
Furnace	2	8%
Oven Range	2	8%
Dishwasher	1	4%
Insulation	1	4%
Other	8	32%
Number of Respondents	25	*

* Multiple response question. Total may not equal 100 percent.

Indicators of Products' Efficiency. The 25 survey participants who purchased efficient products within the past year were asked to indicate how identified the products they purchased as energy efficient. Approximately 40 percent of these respondents indicated that the product's label or tag indicated the products' efficiency; twelve percent (3 respondents) mentioned the ENERGY STAR symbol specifically. Thirty-two percent indicated that they conducted some type of research (online, in a library, etc.) prior to purchasing their products to inform them of the products' efficiency. Twenty-eight percent stated that the appliance retailer informed them of the products' efficiency.